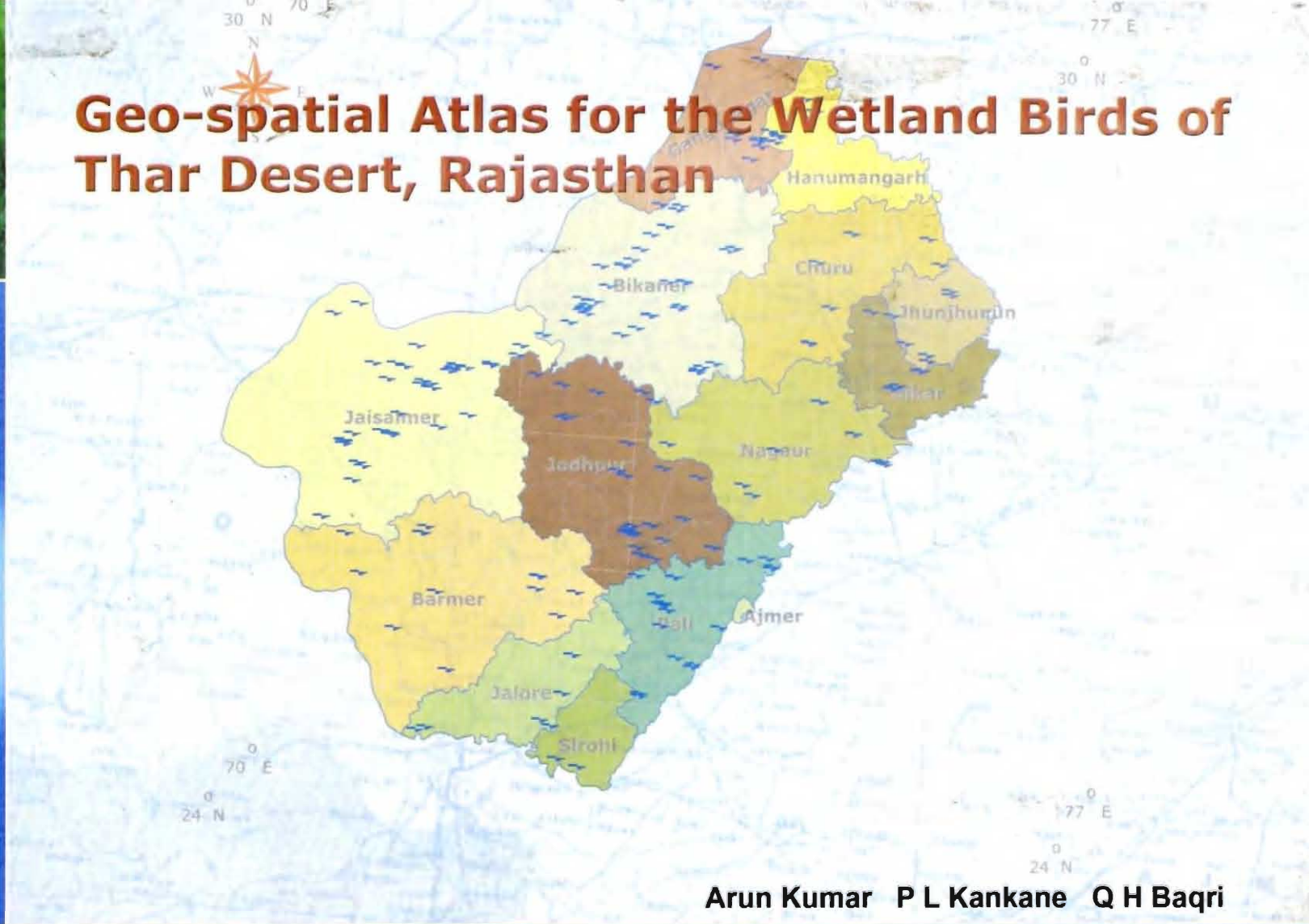




Geo-spatial Atlas for the Wetland Birds of Thar Desert, Rajasthan



Arun Kumar P L Kankane Q H Baqri







Greater Flamingo. Gehan de Silva Wijeyeratne



Flock of Garganey and Wigeon. Gehan de Silva Wijeyeratne

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Zoological Survey of India

Ministry of Environment and Forests, Government of India, Kolkata-700 053

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FOREWORD

Waterbirds are widely distributed across the country across inland and coastal wetlands and a wide range of other habitats, including crop fields, dry grasslands, and even urban spaces. The distribution of birds across these landscapes is dynamic changing with season, rainfall, availability of an abundance and accessibility to food, safe resting and nesting sites. In a landscape where people have converted areas of natural desert into a mosaic of arid scrubland and sand dunes with croplands and villages through extensive irrigation canals, the abundance, diversity and distribution of birds is poised to change. Over time, some species will learn to take advantage of the newly created habitats while other species will be forced out. So while some waterbird species may stand to gain, other dry land specialists may lose out.

Gathering and presenting information on the precise distribution of waterbirds and their habitats is a time intensive process. The efforts of the authors in collating a large body of information assembled in this publication are exemplary. The availability of such an Atlas that clearly provides up to date information on specific distribution and abundance patterns of species at the regional level is extremely important. Presentation of this information in an accessible and easily understandable form will undoubtedly ensure that it provides a valuable and vital guide to inform planners, decision makers, scientists, media and the general public.

During 2005-2006, we have witnessed a rapid spread of highly pathogenic avian influenza H5N1 amongst industrial and backyard poultry across parts of Asia, Europe and Africa. This viral strain is unusual in that it has killed a large number of migratory and resident species of wild birds. In 2005, there has been a major outbreak in Qinghai, China has killed an estimated 6,500 waterbirds, particularly Barheaded Geese, Ruddy Shelduck, Pallas's Gull, Brownheaded Gull and Great Cormorant; since then has killed a wide range of other species. All of these Asian species are known to be migratory to India. Recent research provides evidence that a few species of wild birds (particularly ducks) which are not killed by the highly pathogenic strain are able to harbour it without demonstrating overt symptoms. If it were to be confirmed that some species of migratory birds are able to carry the highly pathogenic strain of the virus over long distances and thereafter to spread it to resident birds or poultry, these species could provide an additional means of spread of this poultry disease.

The possibility of such a strain evolving to one that could lead to an influenza pandemic in humans has raised even greater concern. It is important that all means of spread of the virus should be better studied and understood, to enable implementation of timely and effective responses.

This Atlas for the Wetland Birds of the Thar Desert of Rajasthan by the Zoological Survey of India is an excellent and well-timed production. I hope that it will provide the basis and encouragement for the development of Atlases for our other states and for other countries. The rapid spread of highly pathogenic avian influenza and implications of the pandemic also provide the impetus of bringing together new layers of information of poultry, human and bird distribution and densities that can help to identify potential higher risk areas of spread of the disease through close interaction between poultry, people and wild birds.

Dr. Taej Mundkur

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29th June 2006

FOREWORD

Birds are at the apex of the ecosystem; as such they are the indicator of the health of the environment. It is said that many species of plant and animals will disappear from this planet with extinction of one bird species. It is pity that many common species of birds are at the verge of extinction because of our own fault. This can only serve as a grim warning of how serious environmental pollution is to us.

Birds freely migrate across national boundaries for food shelter and to reproduce for which international cooperation is required and to foster this there are bilateral and multilateral agreements exist yet we find that for lack of proper knowledge and understanding the desired degree of protection to bird habitat and migratory routes are not available to many birds and possibility of their getting extinction is gaining speed.

The indiscriminate land reclamation and unplanned infrastructure developments are diminishing the country's estuaries, swamps and wetlands. As a very sad result, migrating birds are losing places to rest and the ecological balance is being disturbed. Though serious bird watchers have been observing the changes but in absence of hard reliable data no proper management initiatives could be taken. One of the author, Dr. Arun Kumar a fresh-water ecologist realized this problem and has been collecting many data on wetland values, requirements of different birds, data on climate, land use etc. and packaged such information in GIS domain in association with Dr PL Kankane, who is an experienced scientist in the field of Remote Sensing and GIS. Together they have fine tuned with GPS locations and wise use of the information technology to get various options for management purposes. Dr Kumar has also produced a HANDBOOK ON INDIAN WETLAND BIRDS AND THEIR CONSERVATION and his work resulted in establishment of country's first conservation reserve in the state of Uttaranchal, a man made wetland. In present study by packaging field data on wetlands and wetland birds in the state of Rajasthan they have opened new approach to conservation of wetland and wetland birds including that of monitoring and management of BIRD-FLU which has panicked the whole world.

The Atlas not only includes geo-referenced site and count maps for each species but also provides its diagnostics, photograph, painting and a coded distribution map for the whole country to identify the wetland birds in field. Such information at local level will help to a great extent in wetland management in Rajasthan, and could serve as a model for rest of the country. I am sure this pioneer work will provide valuable knowledge that can help planners, managers and research students who can help people connect with nature and live more in harmony with the environment.

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Shri Rati Ram, Publication and Production Officer, Zoological Survey of India, Kolkata over saw the printing of the atlas. Various colleagues at Zoological Survey of India, Dehra Dun helped in many ways for which authors are grateful.

We wish to gratefully acknowledge the contribution and help of all.

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June, 2006

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The primary target of the Atlas is to help birders in field as an effective guide for the identification and surveillance of wetland birds in Thar Desert. To achieve this authors have been greatly obliged by generous and extensive contribution of photographs by internationally renowned bird photographers. Gehan de Silva Wijeyeratne made a major contribution of his bird images for the Atlas for which special thanks are due to him. Vijaya Cavale contributed many photographs from his website 'Birds of India'. Alison Brown, Royal Society for Protection of Birds arranged images of two species for which grateful thanks are due to her.

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Drawing of wetland birds and their national distribution maps have been used from an earlier joint publication by the senior author (Kumar, *et al.*, 2005) under the auspices of Zoological Survey of India, for which thanks are due to the Director, Zoological Survey of India.

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SUMMARY

India has 243 species of waterbirds and 67 species of wetland dependant and associated birds, almost half of which are migratory and come to the subcontinent from their breeding grounds in the northern latitudes of Russia, Central Asian countries, China, Mongolia westward to the Persian Gulf. Detailed information on the distribution of most of these wetland species, their migration strategies and areas and timings of concentration is not well documented or easily accessible.

The country has been characterised by extensive loss of wetlands in last few decades resulting in decline in their ability to support large diversity and abundance of waterbirds. Conservation of these waterbirds hinges on ensuring that safe feeding, resting and nesting sites are maintained and thus conservation and proper management of the remaining wetlands is of extreme importance. Identification of all sites of international and national importance for these species provides a system of prioritization to focus monitoring and conservation efforts and the Convention on Wetlands (Ramsar, Iran, 1971) provides an internationally acceptable basis for assessment of such sites.

The study area is the Thar Desert, Rajasthan, a arid region fed by a major canal system and characterized by shallow reservoirs, fresh water ponds, escape reservoirs, saline lakes, rivers, etc. A total of 144 wetland bird species, including 17 globally threatened species, have been recorded from 275 sites.

On screen digitization was carried out using Window based ArcView 3.1 GIS software, editing was done by using ARCEDIT 7.1.2 for the following spatial attributes, namely, state, district and development block boundaries, settlements, surface drainage, Indira Gandhi Nahar Pariyojna (IGNP) Command area, temperature regimes, evapotranspiration and rainfall.

All the available wetland birds records (published or otherwise) were geo-referenced on a digitized map of the Thar Desert on ARCVIEW platform and GPS point records have been plotted for each observation site. The set of two geo-referenced maps for each species pin point the present extent of geographical distribution of the species in the area and provide the number of individuals recorded at a specific site.

Emphasis has been laid on the following aspects in the present study:

Production of the maps for distribution and concentrations of Globally Threatened species, 1% biogeographic population (SAPE, 2002), species listed under CITES, CMS and Indian Wildlife (Protection) Act, 1972, , distribution and concentrations of species of Anatidae, distribution and concentrations of northern winter migrant species. In addition, maps are produced of the distribution and concentrations of five migratory waterbird species identified by Indian taskforce on avian influenza as potentially higher risk of being infected by the highly pathogenic avian influenza strain H5N1 based on unprecedented numbers of these species being killed by the virus in Qinghai Lake, China in 2005

Based on Ramsar criteria 2 and 6, a total of 25 wetlands in the Thar Desert meet the requirements for inclusion as wetlands of international importance under the Ramsar list of Sites. A consolidated prioritization based on the Ramsar criteria, IWL (P) Act, 1972, CITES and CMS identified a total of eighteen wetlands, six wetlands are located in Pali, three each in Jodhpur and Bikaner, two in Jaisalmer and one each in Hanumangarh, Churu, Nagaur and Barmer districts. A review of adequacy of the Wild Life (Protection) Act, 1972 vis-à-vis wetland birds proposes that Indian waterbirds need more protection under the Act, either by up-gradation of the current listing of schedules of the threatened species or by inclusion of a larger number of species under it.



1. Introduction

The importance of point information on site distribution of waterbirds need not be over emphasized in developing effective strategies for management of wetlands and the waterbird populations. India has 243 species of waterbirds and 67 species of wetland dependant and associated birds (Kumar, et. al., 2005), almost half of which are migratory and come to the subcontinent from their breeding grounds in the northern latitudes of Russia, Central Asian countries, China, Mongolia westward to the Persian Gulf. Detailed information on the distribution of waterbirds in India, their migration strategies and areas and timings of concentration are not well documented or easily accessible.

Some data is being gathered by Asian Waterbird Census and is used as vital tool nationally and internationally for conservation and protection of wetlands as waterbird habitats. The assessment of population sizes and trends provide the basis, endorsed by the Ramsar Convention, most recently through Resolution VIII.38, for 1% population thresholds in the application of Ramsar site designation Criteria 6.

The Indian region has been characterised by extensive loss of wetlands in last few decades, where wetlands have been fully destroyed, partially lost or modified resulting in decline in their ability to support large populations of waterbirds. For the long-term conservation of waterbirds of the region, it is important to identify all sites of international and national importance to focus monitoring and conservation efforts.

Like all living beings, wild birds are infected by a variety of organisms, most of which are restricted to the birds. These wild birds (particularly ducks) are often infected by and carry low pathogenic strains of avian Influenza that do not cause them any severe problem. However, since 1997 there has been growing interest and concern about one particularly highly pathogenic strain of avian influenza virus, H5N1, which is being spread largely through poor poultry (mainly chickens and ducks) raising practices and has lead to the deaths or culling of several million birds and this has had considerable impact on the livelihoods of people dependent on poultry raising. Since 2005, this strain has also been reported to infect and rapidly kill wild birds in unprecedented numbers. This is an important conservation issue, as some of the species have small populations while others are threatened at the national or population scale, including species listed on the Indian Wildlife (P) Act, 1972 {(Black-necked Crane (*Grus nigricollis*), Sarus Crane (*Grus antigone*), Spot-billed Pelican (*Pelecanus philippensis*), Sociable Lapwing (*Vanellus gregarious*), etc)}. Recent

laboratory studies have demonstrated that some infected ducks are not killed by the highly pathogenic strain and are able to harbour it without demonstrating overt symptoms. Additionally, very low frequencies of the highly pathogenic forms of H5N1 in healthy wild ducks in China. Based on this knowledge, if it can be ascertained that some species are able to carry this strain over any great distance and are also able to spread it to other species or poultry, these species could provide an additional mode of spread of the H5N1 strain.

Detailed information on the distribution of waterbirds in India, their migration strategies and areas and timings of concentration are not well documented or easily accessible to government agencies, including environment, animal husbandry, public health workers, epidemiologists, and others who seek such vital information to support development of national AI risk assessments, action plans and contingency plans to deal with H5N1. Although to a large extent available, such information is scattered over a range of agencies, organisations and institutions and needs to be collated and made accessible on a GIS based platform.

Emphasis has been laid on the following aspects in the present study;

1. Geo-referencing and data entry of waterbird, habitat data into standard format.
2. Digitizing of toposheets and plotting of district and blocks boundaries, Indira Gandhi Nahar Pariyojna (IGNP) Command area, surface drainage, settlements, wetlands, and wetland birds.
3. Preparation of overlays of wetlands and other habitats used by waterbirds.
4. Preparation of overlays of waterbird showing their distribution and numbers.
5. Production of maps for distribution and concentrations of Globally Threatened species, 1% biogeographic population (SAPE, 2002), species listed under CITES, CMS and IW(P) Act, 1972.
6. Production of maps for distribution and concentrations of five identified H5N1 reservoir species by Indian taskforce on avian influenza.
7. Production of maps for distribution and concentrations of species of Anatidae.
8. Production of maps for distribution and concentrations of northern winter migrant species.

9. Production of maps identifying wetlands of national and international importance (potential Ramsar sites) for their conservation and management.
10. Production of maps identifying wetlands frequented by five species (Bar-headed geese, Ruddy Shelduck, Pallas's Gull, Brownheaded Gull and Great Cormorant) that are known to have been effected by H5N1 in China during 2005.
11. Identify gaps in knowledge and information.

The present study aims to prepare a GIS-based information system on waterbird distribution and concentration in India, with additional information layers on habitats used by waterbirds, which will assist in identification of potential higher risk areas for spread of AI between poultry and waterbirds.

This publication will also help in highlighting gaps in our knowledge on waterbirds and can be used to prioritise further research and survey. The current information can provide the bench mark for monitoring the impact of human activities in the area.



Asian Openbill-Stork. Gehan de Silva Wijeyeratne

2. Study area

2.1. State of Rajasthan

Rajasthan lies between 23° 30' and 30° 11' N latitude and 69° 29' and 78° 17' E longitude (map 1) in the track of the Arabian Sea branch of the south-west monsoon. The western boundary of the state is part of Indo-Pak international boundary while Punjab and Haryana surround the state in the north, Uttar Pradesh in the east, Madhya Pradesh in the southeast and Gujarat in the southwest. The Aravalli and the plateau of Hadauti being the only highland in the south-east divert the SW monsoon coming from Kathiawar that resulted in creation of the desert in the west (Anonymous, 1994).

Physiography of Rajasthan is the product of long years of erosion and depositional processes. The present landforms and drainage system has been greatly influenced and determined by the geological formation and structures. Four major physiographic regions can be identified within the state, namely,

1. The Western Desert (Thar)
2. The Aravalli Hills
3. The Eastern plains and
4. The South-eastern plateau

The Aravalli hill ranges, running from northeast to southwest divide the state approximately into the western arid and eastern semi-arid regions. It is also a major water divide. The area, to its east, is well drained by integrated drainage systems, while the area to the west, has only one integrated drainage system, i.e., the Luni drainage system in the southeastern part of the desert.

2.1.i. Vegetation

The state of Rajasthan is endowed with a wealth of a wide range of vegetation that can broadly be categorized into two distinct groups. One comprising the arid vegetation, falling into western part of the state, while the other belongs to semi-arid to sub-humid category in the eastern and southern Rajasthan.

The western Rajasthan, characterized by sparse vegetation, is neither barren nor uninhabited. It is covered with bushes and shrubs and even



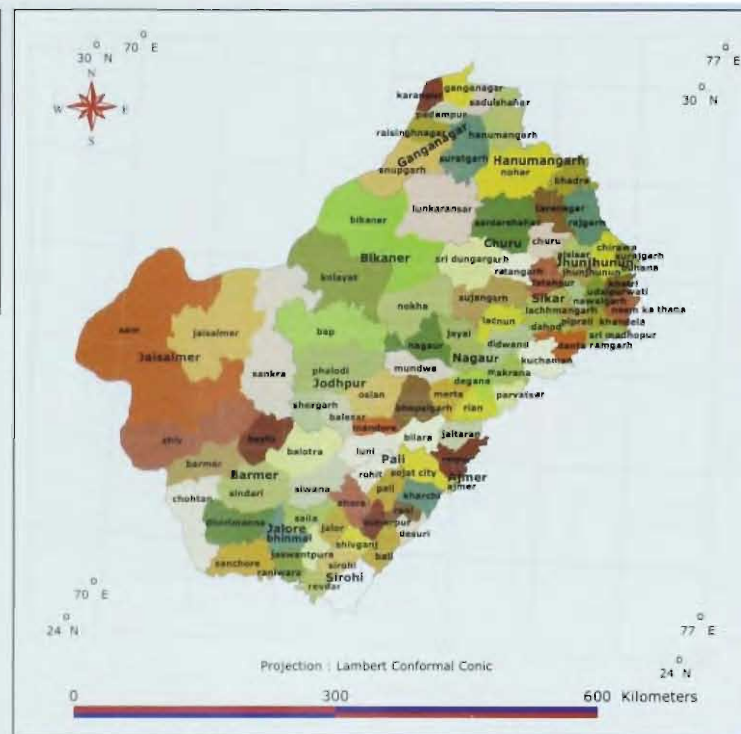
Map 1. India



Map 4. Rajasthan State Showing Thar Desert



Map 5. District Map of Thar Desert



Map 6. Development Block Map of Thar Desert





LEGEND

- DRY DECIDUOUS FOREST (TEAK AND KARDHAI)
- DRY DECIDUOUS FOREST (KARDHAI AND SALAI)
- DRY DECIDUOUS FOREST (KARDHAI AND BAROOL)
- THORN FOREST (ACACIA MIXED)
- THORN FOREST (RAVINE SCRUB)
- SAND DUNES (CALLIGONUM-HALOXYLON LEPTADENIA)
- SAND DUNES (SUAEDA-SALSOLA)
- SAND DUNES (PROSOPIS-CAPPARIS-ZIZYPHUS)
- DESERT (PROSOPIS-ACACIA)
- DESERT (CALLIGONAM AND CAPPARIS)
- SAND DUNES (CALLIGONAM, EUPHORBIA AND ACACIA)
- AGRICULTURE (DOUBLE CROP)
- AGRICULTURE (SINGLE CROP)
- WATER BODY

Map 2. Classified vegetation image of Rajasthan using IRS-IC; ID: WIFS data

small trees which are well adapted to the arid conditions and show great modifications, but the species diversity and dominance is well marked.

It is a great sandy tract with a few rocks that protrude above the lower land now covered with sand apparent to be immobile sand dunes. The grasses on these dunes grow in clumps, indicating the availability of water just beneath the sandy soil. The desert is the roving ground for Camels, Buffaloes and Cows that are known for their strength and size. Today what we observe is the degraded stage and some times extreme degradation in this area. In contrast to the west, eastern region receive up to 160 cm rainfall and largely constitutes the plains, deeply buried or exposed pediments plains or undulating rocky plains, valleys and Aravalli range which contain protected and reserve forest areas. The plains are largely under double cropping and hence the existing vegetation is very much modified due to agricultural operations.

2.1.ii. Forests

According to Champion & Seth (1968) major part of Rajasthan falls under subgroup 6B- Northern Tropical Thorn Forest, with following types:

- C₁ - Desert thorn forest
- C₂ - Ravine thorn forest
- C₃ - Rann thorn forest
- DS₁ - *Zizyphus* scrub
- DS₂ - Tropical *Euphorbia* scrub

The forests are unevenly distributed in various districts and most are over the hilly areas which make up for about 50% of the forests of the state (map 2).

2.1.iii. Wastelands

Wastelands are lands which are degraded and at present lying unutilised or which are not being used to its optimum potential due to different constraints. Broadly these lands can be grouped as cultivable or non-cultivable. As per estimates Rajasthan has about 92.56 lakh hectares of wastelands of different types. Deserted sand cover constitutes about 49.69% of the total wastelands in Rajasthan. The cultivable wastelands are capable of or have the potential for development for agricultural or

pasture purposes or even can be afforested. The non-cultivable wastelands on the other hand are barren lands that can not be put to any productive use either for agriculture or to develop forest cover.

2.1.iv. Wetlands

The average rainfall of the state varies less than 10 cm in the arid western parts to over 160 cm in the Aravalli's. The main rivers of the state are Luni, Gambhiri, Chambal, Banas, Banganga and Matri. Of these, Luni, Kantli and Dohan run across the Thar Desert (map 3).

SAC (1998) estimated that only 1.01% of the state's land is covered by wetlands (each of the size of 56.25 ha and above). Based on above scale a total of 1,054 wetlands covering an area of 3,449.64 sq km, are located in Rajasthan. Prasad, *et.al.* (2004) have prepared an atlas showing district wise spatial distribution of wetlands in Rajasthan.

Table1. The district wise distribution of wetlands in Thar Desert (Prasad, *et.al.* 2004).

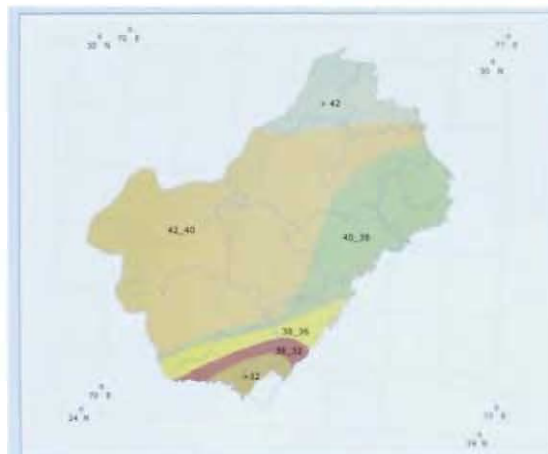
District	Geographical Area (km ²)	Wetland Extent (Km ²)	Per cent of Geographical Area Under Wetlands
Ajmer	8481.00	160.80	1.90
Barmer	283870.00	210.24	0.74
Bikaner	27284.00	17.26	0.06
Dhaulpur	3033.00	52.64	1.74
Ganganagar (including Hanumangarh)	20634.00	83.07	0.40
Jaisalmer	38428.00	212.20	0.55
Jalore	10640.00	385.52	3.62
Jodhpur	22783.00	119.73	0.53
Nagaaur	17718.00	208.94	1.18
Pali	12387.00	189.93	1.53
Sikar	7732.00	9.86	0.13
Sirohi	5136.00	45.24	0.88



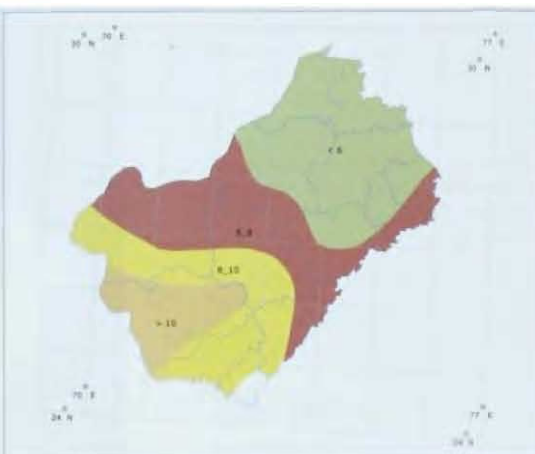
Map 3. Water layer extracted from classified image of Rajasthan using IRS-1D; LISS-III data

The LISS-III data on the district wise distribution of wetlands in Thar desert in the present study has been tabulated in table-3 and also geo-referenced vector maps for the 13 districts of Thar desert have been provided (maps 12-26).

In a recent study Vijayan, *et al.* (2004) prioritised 47 wetlands in Rajasthan in four categories on the basis of wetland birds observed at these sites. Rating was given to each wetland on the basis of data on birds, size and socioeconomic use of the particular wetland. In the present study wetland bird sites in Thar Desert have been prioritised on the basis of presence of GT species, 1% biogeographic population in south Asia {(SAPE,2002) (Wetland International, 2002)}, CITES Appendix I species, CMS Appendix I/II & II species, Species under Schedule I of WL(P) Act, 1972 and identified wetlands with H5N1 effected waterbird species.



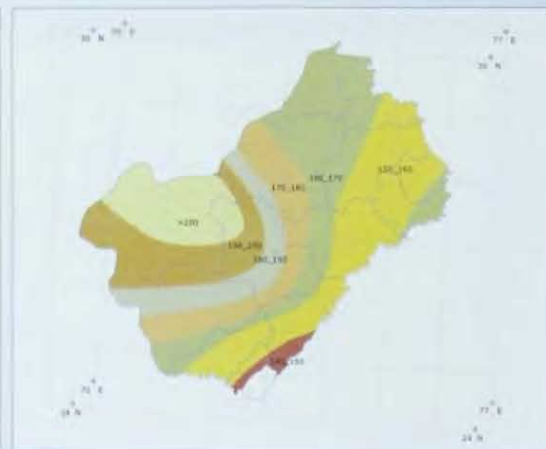
Map 7. Temperature Regimes (in °C) June in Thar Desert



Map 8. Temperature Regimes (in °C) January in Thar Desert



Map 9. Average Annual Rainfall (in cm.) in Thar Desert



Map 10. Mean Annual Potential Evapotranspiration (in cm.) in Thar Desert

2.2. Thar Desert:

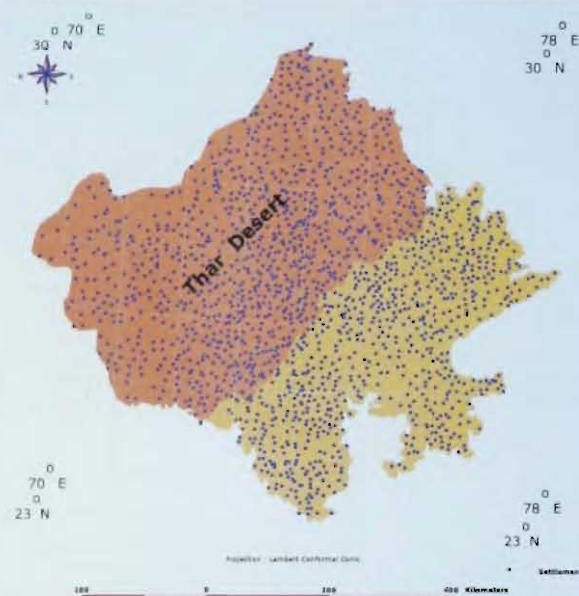
Though the Thar desert or the Great Indian Desert is one of the smallest hot deserts (spread over 2, 85,000 km in India), it is the most populous desert in the world. The major portion of the Indian desert (about 70%) lies in Rajasthan, which is the target area under this study (map 4). Though environmental parameters do not respect political boundaries, our study has been conducted district wise for the sake of administrative convenience in the following 13 districts which signify the heart of the Indian Desert : 1) Ajmer, 2) Barmer, 3) Bikaner, 4) Churu, 5) Hanumangarh , 6) Jaisalmer, 7) Jalore, 8) Jodhpur, 9) Nagaur, 10) Pali, 11) Sikar, 12) Sirohi and 13) Sriganganagar (map 5). The above 13 districts comprise 89 Development Blocks (map 6).

Due to the hostile environment, the Thar Desert is considered a fragile ecosystem in which the minor factors may create imbalance. From biodiversity point of view, the Thar may not be rich but is interesting, mainly because of the following two reasons. Firstly, the Thar is the extension of Sahara desert through Persian and Arabian deserts and is located at the meeting point of Palaearctic and Oriental biogeographical regions, therefore has the admixture of Palaearctic, Oriental and Saharan elements in the biodiversity. Secondly, both plant and animal species constitute an invaluable stock of rare and resistant germ plasm. Though the biodiversity in the Thar is important, presently it is under great pressure in order to meet the demand of food and fodder for increased human and livestock populations respectively. Despite all these features, the Thar exhibits a wide variety of habitats and faunal diversity.

2.2.i. Climate

The climate of Thar is arid to the west of the Aravalli range characterized by low humidity and high wind velocity. A marked variation in diurnal and seasonal range of temperatures occurs throughout the area that is the most characteristic phenomenon of warm-dry continental climate. The summer begins from the month of March with temperature rising progressively through April, May and June (map 7). The winter season is during December to February, with marked decline in minimum temperature in December and January (map 8). A sharp decline in night temperatures is experienced throughout the arid and semi-arid zone of western Rajasthan on account of quick release of thermal radiation from sandy soil soon after the dusk.

The climate is marked by low rainfall with erratic distribution. The general trend of Isohyets is from NW to SE (map 9). There is a very rapid and



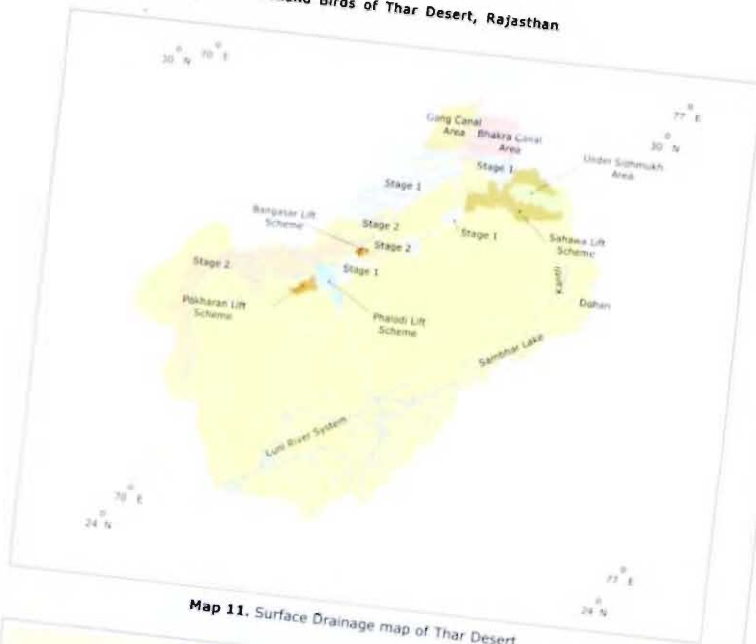
Map of Human settlements in Rajasthan based on 1:1000000 toposheet

marked decrease in rainfall west of Aravalli range making western Rajasthan most arid part in the state.

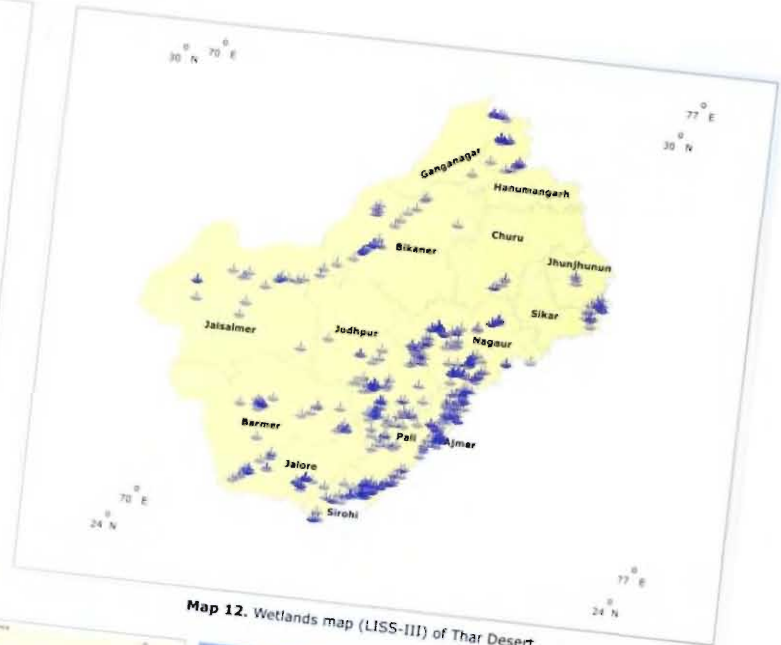
Potential evapo-transpiration is higher than precipitation even during rainy months in the western part of Rajasthan, making these regions arid to extremely arid in climate with perpetual water deficit throughout the year (map 10).

2.2.ii. Aravalli Hills

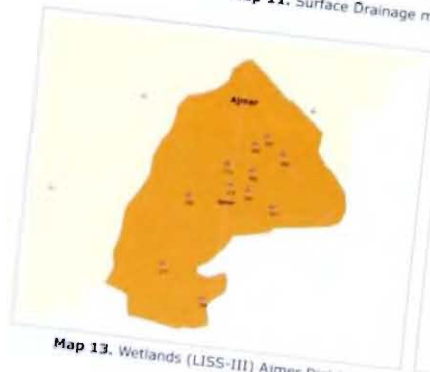
The Aravalli hill ranges constitute the most dominant hilly area of Rajasthan. The range runs diagonally across the state from northeast to southwest dividing the state approximately into the western arid (Thar



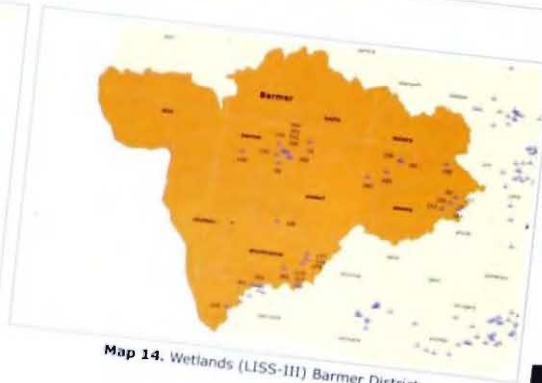
Map 11. Surface Drainage map of Thar Desert



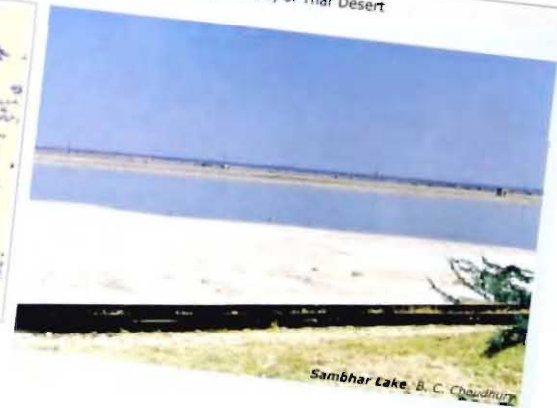
Map 12. Wetlands map (LISS-III) of Thar Desert



Map 13. Wetlands (LISS-III) Ajmer District



Map 14. Wetlands (LISS-III) Barmer District



Desert) and eastern semi-arid regions (map 4). It is also a major water divide. The area, to its east, is well drained by integrated drainage systems, while the area to the west, has only one prominent drainage system, i.e., the Luni River in the southeastern part of the desert (map 11).

2.2.iii. Surface Drainage

The rivers of Rajasthan, except for the Chambal, are seasonal and flow generally during the rainy season. The Aravalli range largely influence the drainage system of the state including Thar Desert that has an inland drainage system comprising catchments of rivers Luni, Katli, Dohn and Sambhar Lake (map 11).

Luni River originates in Nag Pahar in Ajmer and flows to south-west through Jodhpur, Barmer and Jalore over a distance of about 320 km, covering a total catchment area of 34,250 sq. km. that also spreads over part of Nagaur. The river flows only during rainy season and even at this time it is choked with advancing sands at many places. As a result of this, the run off spreads to the adjoining fields on both the banks of the river. A number of streams and tributaries like Bandi, Sukri, Mithri, Jawai, Sagi, Jojri, Lirri, Guhiya, etc. flows on the western side of the Aravalli range and drain the run off of some parts of Pali, Jalore, Sirohi and Barmer district areas (Map 11).

Katli River originates from Khandela hills of Sikar district. It flows during the rainy season only. After flowing over a distance of 100 km towards north, through Sikar and Jhunjhunun districts, it enters Churu district where its water is lost in the sandy terrain (map 11) (Anonymous, 1994).

2.2.iv. Indira Gandhi Nahar Pariyojana (IGNP):

IGNP is a mega Irrigation project with the aim of fetching the river water to the waste stretches of desert in western Rajasthan from the Himalayas. The water is diverted from Hari-ke-Barrage in Punjab and travels for about

650 km to Rajasthan. The project was started in 1958 and partial irrigation facility began in 1961. It comprises two stages viz., stage II and I. Stage I comprises all command land whose canal system took from 0 to 74 km of main canal, while the phase II comprises from 74 to 189 km of main canal. By and large the work has been completed in Stage I (both phases), while Stage II is targeted to be completed shortly. On completion of IGNP, it is expected to create irrigation potential of 15.85 lakh hectare of semi-arid and arid desert wasteland into a Cultural Command Area (CCA) spanning across four districts of Thar Desert of Rajasthan, namely, Ganganagar, Bikaner, Hanumangarh and Jaisalmer. The project is envisaged in two stages. Stage-I irrigates 6.19 lakh ha and consists of all command land whose canal system took off from 0 to 74 km of main canal. Stage-II covered the remaining 9.5 lakh ha and comprised construction from 74 km to 189 km of main canal, besides including the left out area of Stage-I phase-I. Stage-II has further been divided into six regions for purpose of execution. Many urban settlements and rural villages of districts Bikaner, Churu, Ganganagar and Jodhpur fetch drinking water through lift system on left side of canal (Anonymous, 1994) (map 11).

2.2.v. Gang Canal Project

The Gang Canal system is one of the oldest in Rajasthan, irrigating north-western part of Ganganagar (map 11). The construction of canal was started in 1920 and was completed by 1928. The total length of the system is 1251 km in Rajasthan. The Bikaner Canal feeder to Gang canal provides water to the extent of CCA of 3, 07,692 ha.

2.2.vi. Bhakra Project

It mainly utilizes the perennial flow of the Indus river basin as per 1955 Indus River treaty Rajasthan was permitted to utilize the CCA of 3, 72,469 of land under Bhakra Command in Thar Desert. The irrigation was started on a limited scale in 1955 from Bhakra system (map 11).

3. Methodology

3.1. Data source:

3.1.i. Wetland birds diversity in Thar Desert

A number of studies have been conducted on the avifauna of Thar desert though they are mainly either from Kutch and Saurashtra part of Gujarat or in Sind, which is now in Pakistan. Adam (1873 & 1874) was the first to report birds of Sambhar Lake and vicinity from Rajasthan part of the Thar Desert. Our major knowledge of birds of the area is derived from the work of Whistler (1938) who conducted systematic surveys (1933-34) in erstwhile Jodhpur State (which roughly constituted Jodhpur, Jalore, Nagaur, and Pali districts of present State of Rajasthan) and studies conducted by Rahmani (1996 & 1997) on avian fauna of Jodhpur, Barmer, Bikaner, Churu, Ganganagar and Nagaur districts during 1993-94. Besides, there are few supplementary reports on birds of Thar by Agoramoorthy & Mohnot (1986); Bohra & Goyal (1992); Sangha & Kulshreshtha (1993); Sangha (1994); Soni (1994); Rana, Jain & Tripathi (1996); Kumar & Musavi (2001); Changani (2002). Recently Sangha (2002a, b) published additional notes on the avifauna of the Thar Desert in which he has also updated the accounts by Rahmani (1997). He further (Sangha, 2005) chronicled the sightings of Sociable Lapwing *Vanellus gregarius*, a Critically Threatened species, from Rajasthan.

Under a recent project on the "Faunal diversity of Thar desert" (Bagri, 2004 Unpublished) by the Ministry of Environment and Forests more than 150 wetland bird sites have been listed from the Thar Desert during the years 2000-2004. These sightings record more than 100 species of wetland birds from the study area.

In the present study all the available records (published or otherwise) have been geo-referenced on a digitized map of Thar Desert on ARCVIEW platform. It is pertinent that each bird sighting, even from the same area, has been given a unique site code which sum up to a total of 275 geo-referenced sites (Annexure 1). Based on data collected and collated from the above sites geo-referenced distribution maps of 144 species (table 2) of wetland birds have been drawn displaying the extent of present geographical distribution and number of birds from each such site. Since the list of wetland birds by Mukherjee (1995) and some other authors do not give locality records of many species, they have been allotted a single site code for each author (Annexure 1).

Species wise composite plates have been prepared depicting both the above maps, at least one photograph, one painting, diagnostics, habitat, habits, food, and a coloured map showing its geographical and seasonal distribution in India for each species. Conservation, legal, residential and abundance status has been provided for all species.

Through this communication we have made an attempt to give a comprehensive picture of avifauna of wetlands of Thar Desert on a geospatial platform.

3.1.ii. Creation of Geospatial layers:

On screen digitization was carried out using Window based ArcView 3.1 GIS software, editing was done by using ARCEdit 7.1.2 for the following spatial attributes, namely, state, district and development block boundaries, settlements, surface drainage, IGNP, temperature regimes, evapotranspiration and rainfall. The details of base maps used, and their associated attributes are given in Annexure, 2. These layers were created at Indian Institute of Remote Sensing, Dehra Dun for an earlier collaborative study for the state of Rajasthan (Alfred, et al. 2001).

3.1.iii. Mapping of the wetlands:

Land use classification image is derived, after analysis, from IRS-1D LISS III (bands 2,3,4,5; resolution 23.5 m) remote sensing data using ERDAS Imagine 8.7 from Forest Survey of India pertaining to the period October, November and December 2002, comprising 23 scenes (cf. Annexure 2C). The IRS-1D LISS III data from FSI is geo-referenced with reference to 1:50,000 Survey of India Toposheets.

Water layer was extracted from the classified data/ image (from FSI) and was geo-referenced with existing vector layer of the study area (Annexure 2A). Based on this point maps of wetlands were digitized (map 12 to 26; table 3) for each district of the Thar Desert.

3.2. Data presentation

3.2.i. Species text

Each species has been described in an individual plate.

Species header: A colour coding system is used to indicate the conservation status of each species, namely: *Red header* for globally threatened species; *Orange header* for near threatened species; and *Blue*

header for rest of the species. Each header begins with scientific and common name, which are after Mankadan & Pittie (2001). This is followed by its multiple status, that is conservation, legal, residential, abundance and its listing under CMS, CITES and Indian WL (P) Act, 1972. The threat status of each species is derived by using various IUCN Red List categories (BirdLife Int., 2004). The residential and abundance status is with their various sub and sub-sub categories at state level.

The identification of a bird is generally based on a combination of various characteristics, which includes not only the plumage but also overall colour, habitat, season and behaviour when feeding, flying, displaying or flocking. The Atlas exhibits information on as many as possible of these essential clues for identifying wetland birds. The description of each species begins with its diagnostics, followed by its habitat, habits and food. Photographs highlighting the diagnostics, sexual dimorphism and seasonal variations of the species have been provided. One profile of every species is illustrated by a drawing to a marked scale. Important variations in appearance of the species are included, whether between male and female, adult or juvenile.

3.2.ii. Maps














3.2.ii.a. Set of two Geo-spatial maps have been generated for each species to provide point information on observation sites.













- Site map:** For most sites, geographical coordinates of unique site codes are included in the database and have been used for plotting the maps using ARCVIEW 3.1 programme (map 27). However, it was not possible to geo-reference those sites for which coordinates are either missing or only partially available. However, to make possible the present extent of occurrence of the species in study area these records are plotted approximately in the site maps.
- Count map:** The numbers of waterbirds counted at the geo-referenced sites are plotted using graduated symbol option. The dots have been graduated in different groups generated by the software programme and represent the group in which the actual count falls.
- Blank map:** Mukherjee (1995) listed many species of wetland birds from Thar Desert without specific locality records. Blank maps have been provided for all such species.

Both, the site and count maps have been provided for all the species individually. The site map is on the left and the count map on the right side of each plate.

3.2.ii.b. Coloured distribution maps for all the wetland bird species have been provided to show the geographical range occupied by each species in India. Four colours are used on these maps: red represents the geographical area normally used by the species for breeding (summers), blue represents the geographical area used in the non-breeding season (winters), and green indicates areas where the species is present all year round, while orange represent the areas where species is in passage either autumn or spring. Following different symbols are used to indicate the extent of distribution and level of population(s). Although care has been taken to provide precise extent of occurrence, however, the small size of maps does not allow extreme precision. These maps are not to the scale.

3.2.iii. Symbols used:

	Vagrant
	Rare
	Possibly extinct
	Critical
	Resident
	Occasional Resident population
	Winter migrant
	Occasional winter migrant population
	Summer visitor
	Passage migrant
	Isolated population (resident)
	Isolated population (winter)
	Isolated population (summer)

	Isolated population (passage)
	Isolated record (resident)
	Isolated record (winter)
	Isolated record (summer)
	Isolated record (passage)
	Isolated record (unspecified season)
	Small isolated population
	Isolated records without specific locality (resident)
	Isolated record(s) without specific locality (winter)
	Isolated record(s) without specific locality (summer)
	Isolated record(s) without specific locality (passage)
	Isolated record(s) without specific locality & season
	Occasional breeding/ has bred
	Possible breeding
	Mass summer influx
	Occasional small winter migrant population
	Occasional small summer migrant population
	Occasional small resident population
	Globally Threatened (GT)
	Near Threatened (NT)

3.2. iv. Charts:

Wetlands in Thar Desert have been prioritised for protection on the basis of a cumulative value assigned for species of conservation importance recorded at each wetland. The following criteria have been used, namely:

a. Ramsar Criteria (Li & Mundkur 2004):

Group B of the Criteria. Sites of international importance for conserving biological diversity

Criteria based on species and ecological communities

Criterion 2: A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities.

Specific criteria based on waterbirds

Criterion 6. A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of waterbird.

The Red List of threatened species {Globally Threatened (GT) and Near Threatened (NT) species} has been adopted from BirdLife International (2004).

The 1% biogeographic population has been estimated from south Asia for the year 2002 (SAPE, 2002) (Kumar, *et al.*, 2005) and has been based on the population estimates from Waterbird Population Estimates, Third Edition (Delany and Scott, 2002).

Point method was applied by authors to assign weight to the GT species, i.e., 5 points for Critically threatened (CR) species, 3 for Endangered (EN) species, 2 for Vulnerable (VU) species and 1 for NT species. Similarly 5 points were allotted to species having 1% biogeographic population. In such cases where the 1% population was marginally less, 4 points are allotted to the species. Wetlands that were found to meet the Ramsar criteria among the wetlands surveyed, are prioritised on the sum of points scored on GT species + 1% biogeographic population criteria.

b. All criteria:

Authors have also made an attempt to assign a consolidated conservation value to the wetlands by allotting additional weightage to each wetland on the basis of the species of conservation value listed under various conventions (CITES & CMS) and Indian Wildlife (P) Act, 1972.

Five point each have been allotted to species listed either under schedule I of Indian WL (P) Act, Appendix I of CITES and CMS, while 3 points are allotted to species listed under Appendix II of CITES or CMS.

3.2.v. Table 2. Wetland Birds of the Thar Desert of Rajasthan

Sr. No.	Order	Family	Kumar et al. 2005 Sr. no.	Common Name	Species	Red List category (IUCN, 2004)	CITES Appendices	CMS Appendices	Schedules of WL(P) Act, 1972	Residential Status	SAPE 2002(1%)
1	2	3	4	5	6	7	8	9	10	11	12
1	Podicipediformes	Podicipedidae	2	Little Grebe	<i>Trachybaptus ruficollis</i> (Pallas, 1764)				IV	R/LM	10,000
2	Podicipediformes	Podicipedidae	4	Great Crested Grebe	<i>Podiceps cristatus</i> (Linnaeus, 1758)				IV	WM/R	250
3	Podicipediformes	Podicipedidae	6	Black-necked Grebe	<i>Podiceps nigricollis</i> Brehm, 1831				IV	WM	250
4	Pelecaniformes	Pelecanidae	23	Great White Pelican	<i>Pelecanus onocrotalus</i> Linnaeus, 1758			I/II	IV	R/WM	230
5	Pelecaniformes	Pelecanidae	24	Spot-billed Pelican	<i>Pelecanus philippensis</i> Gmelin, 1789	GT/Vu			IV	R/LM	40
6	Pelecaniformes	Pelecanidae	25	Dalmatian Pelican	<i>Pelecanus crispus</i> Bruch, 1832	GT/Vu	I	I/II	IV	WM	110
7	Pelecaniformes	Anhingidae	29	Little Cormorant	<i>Phalacrocorax niger</i> (Vieillot, 1817)				IV	R/LM	1.5
8	Pelecaniformes	Phalacrocoracidae	30	Indian Shag	<i>Phalacrocorax fuscicollis</i> Stephens, 1826				IV	R/LM	300
9	Pelecaniformes	Phalacrocoracidae	31	Great Cormorant	<i>Phalacrocorax carbo</i> (Linnaeus, 1758)				IV	WM	1,000
10	Pelecaniformes	Anhingidae	32	Darter	<i>Anhinga melanogaster</i> Pennant, 1769	NT			IV	R/LM	40
11	Ciconiiformes	Ardeidae	36	Little Egret	<i>Egretta garzetta</i> (Linnaeus, 1766)				IV	R/LM	600
12	Ciconiiformes	Ardeidae	39	Grey Heron	<i>Ardea cinerea</i> Linnaeus, 1758				IV	R/WM	200
13	Ciconiiformes	Ardeidae	42	Purple Heron	<i>Ardea purpurea</i> Linnaeus, 1766			II	IV	R/LM	250
14	Ciconiiformes	Ardeidae	43	Large Egret	<i>Casmerodius alba</i> (Linnaeus, 1758)			II	IV	R/LM	250
15	Ciconiiformes	Ardeidae	44	Median Egret	<i>Mesophoyx intermedia</i> (Wagler, 1829)				IV	R/LM	250
16	Ciconiiformes	Ardeidae	45	Cattle Egret	<i>Bubulcus ibis</i> (Linnaeus, 1758)				IV	R/AM	0
17	Ciconiiformes	Ardeidae	46	Indian Pond-Heron	<i>Ardeola grayii</i> (Sykes, 1832)				IV	R/LM	10,000
18	Ciconiiformes	Ardeidae	48	Little Green Heron	<i>Butorides striatus</i> (Linnaeus, 1758)				IV	R	250
19	Ciconiiformes	Ardeidae	49	Black-crowned Night-Heron	<i>Nycticorax nycticorax</i> (Linnaeus, 1758)				IV	R/LM	1,000
20	Ciconiiformes	Ardeidae	51	Little Bittern	<i>Ixobrychus minutus</i> (Linnaeus, 1766)			II	IV	R/LM	250
21	Ciconiiformes	Ardeidae	52	Yellow Bittern	<i>Ixobrychus sinensis</i> (Gmelin, 1789)				IV	R/LM	0
22	Ciconiiformes	Ardeidae	53	Chestnut Bittern	<i>Ixobrychus cinnamomeus</i> (Gmelin, 1789)				IV	R/LM	0

Geo-spatial Atlas for the Wetland Birds of Thar Desert, Rajasthan

1	2	3	4	5	6	7	8	9	10	11	12
23	Ciconiiformes	Ardeldae	54	Black Bittern	<i>Dupetor flavicollis</i> (Latham, 1790)				IV	R/LM	1,000
24	Ciconiiformes	Ardeldae	55	Great Bittern	<i>Botaurus stellaris</i> (Linnaeus, 1758)			II	IV	WM	0
25	Ciconiiformes	Ciconiidae	56	Painted Stork	<i>Mycteria leucocephala</i> (Pennant, 1769)	NT			IV	R/LM	150
26	Ciconiiformes	Ciconiidae	57	Asian Openbill-Stork	<i>Anastomus oscitans</i> (Boddaert, 1783)				IV	R/LM	1,250
27	Ciconiiformes	Ciconiidae	58	Black Stork	<i>Ciconia nigra</i> (Linnaeus, 1758)		II	II	IV	WM/PM	100
28	Ciconiiformes	Ciconiidae	59	White-necked Stork	<i>Ciconia episcopus</i> (Boddaert, 1783)			II	IV	R	250
29	Ciconiiformes	Ciconiidae	62	Black-necked Stork	<i>Ephippiorhynchus asiaticus</i> (Latham, 1790)	NT			IV	R	10
30	Ciconiiformes	Threskiornithidae	65	Glossy Ibis	<i>Plegadis falcinellus</i> (Linnaeus, 1766)			II	IV	R/M/LM	250
31	Ciconiiformes	Threskiornithidae	66	Oriental White Ibis	<i>Threskiornis melanocephalus</i> (Latham, 1790)	NT			IV	R/LM	100
32	Ciconiiformes	Threskiornithidae	67	Black Ibis	<i>Pseudibis papillosa</i> (Temminck, 1824)	BRS (11)			IV	R	100
33	Ciconiiformes	Threskiornithidae	68	Eurasian Spoonbill	<i>Platalea leucorodia</i> Linnaeus, 1758		II	II	I	R	230
34	Phoenicopteriformes	Phoenicopteridae	69	Greater Flamingo	<i>Phoenicopterus ruber</i> Linnaeus, 1758		II	II	IV	R/WM/LM	2,900
35	Phoenicopteriformes	Phoenicopteridae	70	Lesser Flamingo	<i>Phoenicopterus minor</i> (Geoffroy, 1798)	NT	II	II	IV	R/LM	1,500
36	Anseriformes	Anatidae	72	Lesser Whistling-Duck	<i>Dendrocygna javanica</i> (Horsfield, 1821)				IV	R/LM	10,000
37	Anseriformes	Anatidae	80	Greylag Goose	<i>Anser anser</i> (Linnaeus, 1758)			II	IV	WM	150
38	Anseriformes	Anatidae	81	Bar-headed Goose	<i>Anser indicus</i> (Latham, 1790)				IV	R/WM	560
39	Anseriformes	Anatidae	84	Brahminy Shelduck	<i>Tadorna ferruginea</i> (Pallas, 1764)			II	IV	R/WM/PM	500
40	Anseriformes	Anatidae	85	Common Shelduck	<i>Tadorna tadorna</i> (Linnaeus, 1758)			II	IV	WM	1,000
41	Anseriformes	Anatidae	87	Comb Duck	<i>Sarkidiornis melanotos</i> (Pennant, 1769)		II	II	IV	R/LM	60
42	Anseriformes	Anatidae	88	Cotton Teal	<i>Nettapus coromandelianus</i> (Gmelin, 1789)				IV	R/LM	1,000
43	Anseriformes	Anatidae	90	Gadwall	<i>Anas strepera</i> Linnaeus, 1758			II	IV	WM	1,500
44	Anseriformes	Anatidae	92	Eurasian Wigeon	<i>Anas penelope</i> Linnaeus, 1758			II	IV	WM	2,500
45	Anseriformes	Anatidae	93	Mallard	<i>Anas platyrhynchos</i> Linnaeus, 1758			II	IV	R/WM	750
46	Anseriformes	Anatidae	94	Spot-billed Duck	<i>Anas poecilorhyncha</i> J.R. Forester, 1781				IV	R/WM	500
47	Anseriformes	Anatidae	95	Northern Shoveller	<i>Anas clypeata</i> Linnaeus, 1758			II	IV	WM	10,000
48	Anseriformes	Anatidae	97	Northern Pintail	<i>Anas acuta</i> Linnaeus, 1758			II	IV	WM	0
49	Anseriformes	Anatidae	98	Garganey	<i>Anas querquedula</i> Linnaeus, 1758			II	IV	WM	2,500
50	Anseriformes	Anatidae	100	Common Teal	<i>Anas crecca</i> Linnaeus, 1758			II	IV	WM	4,000
51	Anseriformes	Anatidae	101	Marbled Teal	<i>Marmaronetta angustirostris</i> (Menetries, 1832)	GT/Vu		I/II	IV	WM	50
52	Anseriformes	Anatidae	103	Red-crested Pochard	<i>Rhodonessa rufigula</i> (Pallas, 1773)			II	IV	WM	1,000
53	Anseriformes	Anatidae	104	Common Pochard	<i>Aythya ferina</i> (Linnaeus, 1758)			II	IV	WM	10,000

1	2	3	4	5	6	7	8	9	10	11	12
54	Anseriformes	Anatidae	105	Ferruginous Pochard	<i>Aythya nyroca</i> (Guldenstadt, 1770)	NT		I/II	IV	R/WM	0
55	Anseriformes	Anatidae	107	Tufted Pochard	<i>Aythya fuligula</i> (Linnaeus, 1758)			II	IV	WM	10,000
56	Anseriformes	Anatidae	108	Greater Scaup	<i>Aythya marila</i> (Linnaeus, 1761)			II	IV	WM	3,000
57	Gruiformes	Gruidae	115	Sarus Crane	<i>Grus antigone</i> (Linnaeus, 1758)	GT/VU	II	I/II	IV	R/LM	90
58	Gruiformes	Gruidae	116	Demoiselle Crane	<i>Grus virgo</i> (Linnaeus, 1758)		II	II	IV	WM	1,000
59	Gruiformes	Gruidae	117	Common Crane	<i>Grus grus</i> (Linnaeus, 1758)		II	II	IV	WM	700
60	Gruiformes	Rallidae	124	Water Rail	<i>Rallus aquaticus</i> Linnaeus, 1758				IV	R/WM	0
61	Gruiformes	Rallidae	127	White-breasted Waterhen	<i>Amamornis phoenicurus</i> (Pennant, 1769)				IV	R	0
62	Gruiformes	Rallidae	133	Watercock	<i>Gallinix cinerea</i> (Gmelin, 1789)				IV	R/WM	0
63	Gruiformes	Rallidae	134	Purple Moorhen	<i>Porphyrio porphyrio</i> (Linnaeus, 1758)				IV	R/LM	0
64	Gruiformes	Rallidae	135	Common Moorhen	<i>Gallinula chloropus</i> (Linnaeus, 1758)				IV	R/WM	0
65	Gruiformes	Rallidae	136	Common Coot	<i>Fulica atra</i> Linnaeus, 1758			II	IV	R/WM	15,000
66	Charadriiformes	Jacaniidae	138	Pheasant-tailed Jacana	<i>Hydrophasianus chirurgus</i> (Scopoli, 1786)				IV	R/LM/SM	1,000
67	Charadriiformes	Jacaniidae	139	Bronze-winged Jacana	<i>Metopidius indicus</i> (Latham, 1790)				IV	R	0
68	Charadriiformes	Haematopodidae	141	Eurasian Oystercatcher	<i>Haematopus ostralegus</i> Linnaeus, 1758				IV	WM	3,500
69	Charadriiformes	Charadriidae	143	Pacific Golden Plover	<i>Pluvialis fulva</i> (Gmelin, 1789)				IV	WM	750
70	Charadriiformes	Charadriidae	144	Grey Plover	<i>Pluvialis squatarola</i> (Linnaeus, 1758)			II	IV	WM	300
71	Charadriiformes	Charadriidae	147	Little Ringed Plover	<i>Charadrius dubius</i> Scopoli, 1786			II	IV	R/WM	1,000
72	Charadriiformes	Charadriidae	148	Kentish Plover	<i>Charadrius alexandrinus</i> Linnaeus, 1758			II	IV	R/WM	1,000
73	Charadriiformes	Charadriidae	149	Lesser Sand Plover	<i>Charadrius mongolus</i> Pallas, 1776			II	IV	R/WM	1,000
74	Charadriiformes	Charadriidae	150	Greater Sand Plover	<i>Charadrius leschenaultii</i> Lesson, 1826			II	IV	WM	1,000
75	Charadriiformes	Charadriidae	154	Northern Lapwing	<i>Vanellus vanellus</i> (Linnaeus, 1758)			II	IV	WM	250
76	Charadriiformes	Charadriidae	155	Yellow-wattled lapwing	<i>Vanellus malabaricus</i> (Boddaert, 1783)	BR5(11)			IV	R/LM	0
77	Charadriiformes	Charadriidae	158	Red-wattled Lapwing	<i>Vanellus indicus</i> (Boddaert, 1783)				IV	R/LM	0
78	Charadriiformes	Charadriidae	159	Sociable Lapwing	<i>Vanellus gregarius</i> (Pallas, 1771)	GT/Cr		I/II	IV	WM	2
79	Charadriiformes	Charadriidae	160	White-tailed Lapwing	<i>Vanellus leucurus</i> (Lichtenstein, 1823)			II	IV	WM	1,000
80	Charadriiformes	Scolopacidae	161	Eurasian Woodcock	<i>Scolopax rusticola</i> Linnaeus, 1758				IV	R/AM/WM	0
81	Charadriiformes	Scolopacidae	167	Common Snipe	<i>Gallinago gallinago</i> (Linnaeus, 1758)			II	IV	R/WM	0
82	Charadriiformes	Scolopacidae	168	Jack Snipe	<i>Limnocyrtus minimus</i> (Brunnich, 1764)			II	IV	WM	0
83	Charadriiformes	Scolopacidae	169	Black-tailed Godwit	<i>Limosa limosa</i> (Linnaeus, 1758)			II	IV	WM	1,000
84	Charadriiformes	Scolopacidae	170	Bar-tailed Godwit	<i>Limosa lapponica</i> (Linnaeus, 1758)			II	IV	WM	1,300

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1	2	3	4	5	6	7	8	9	10	11	12
85	Charadriiformes	Scolopacidae	171	Whimbrel	<i>Numenius phaeopus</i> (Linnaeus, 1758)			II	IV	WM	1,000
86	Charadriiformes	Scolopacidae	172	Eurasian Curlew	<i>Numenius arquata</i> (Linnaeus, 1758)			II	IV	WM	1,000
87	Charadriiformes	Scolopacidae	173	Spotted Redshank	<i>Tringa erythropus</i> (Pallas, 1764)			II	IV	WM	250
88	Charadriiformes	Scolopacidae	174	Common Redshank	<i>Tringa totanus</i> (Linnaeus, 1758)			II	IV	R/WM	10,000
89	Charadriiformes	Scolopacidae	175	Marsh Sandpiper	<i>Tringa stagnatilis</i> (Bechstein, 1803)			II	IV	WM	0
90	Charadriiformes	Scolopacidae	176	Common Greenshank	<i>Tringa nebularia</i> (Gunner, 1767)			II	IV	WM	1,000
91	Charadriiformes	Scolopacidae	178	Green Sandpiper	<i>Tringa ochropus</i> Linnaeus, 1758			II	IV	WM/PM	0
92	Charadriiformes	Scolopacidae	179	Wood Sandpiper	<i>Tringa glareola</i> Linnaeus, 1758			II	IV	WM	10,000
93	Charadriiformes	Scolopacidae	180	Terek sandpiper	<i>Xenus cinereus</i> (Guldenstadt, 1774)				IV	WM/PM	1,000
94	Charadriiformes	Scolopacidae	181	Common Sandpiper	<i>Actitis hypoleucos</i> Linnaeus, 1758				IV	R/WM	0
95	Charadriiformes	Scolopacidae	189	Little Stint	<i>Calidris minuta</i> (Leisler, 1812)			II	IV	WM	2,000
96	Charadriiformes	Scolopacidae	191	Temminck's Stint	<i>Calidris temminckii</i> (Leisler, 1812)			II	IV	WM	1,000
97	Charadriiformes	Scolopacidae	193	Dunlin	<i>Calidris alpina</i> (Linnaeus, 1758)			II	IV	WM	1,000
98	Charadriiformes	Scolopacidae	194	Curlew Sandpiper	<i>Calidris ferruginea</i> (Pontoppidon, 1813)			II	IV	WM	1,000
99	Charadriiformes	Scolopacidae	195	Broad-billed Sandpiper	<i>Limicola falcinellus</i> (Pontoppidon, 1763)			II	IV	WM	630
100	Charadriiformes	Scolopacidae	196	Buff-breasted Sandpiper	<i>Tryngites subruficollis</i> (Vieillot, 1819)	NT		I/II	IV	WM	150
101	Charadriiformes	Scolopacidae	197	Ruff	<i>Philomachus pugnax</i> (Linnaeus, 1758)			II	IV	WM/PM	1,000
102	Charadriiformes	Recurvirostridae	199	Black-winged Stilt	<i>Himantopus himantopus</i> (Linnaeus, 1758)			II	IV	R/LM	10,000
103	Charadriiformes	Recurvirostridae	200	Pied Avocet	<i>Recurvirostra avosetta</i> Linnaeus, 1758			II	IV	WM/R	1,000
104	Charadriiformes	Phalaropodidae	201	Red-necked Phalarope	<i>Phalaropus lobatus</i> (Linnaeus, 1758)			II	0	WM	0
105	Charadriiformes	Burhinidae	204	Great Stone-Plover	<i>Esacus recurvirostris</i> (Cuvier, 1829)			?	IV	R/LM	0
106	Charadriiformes	Glareolidae	206	Collared Pratincole	<i>Glareola pratincola</i> (Linnaeus, 1766)			II	0	R	240
107	Charadriiformes	Glareolidae	208	Small Pratincole	<i>Glareola lactea</i> Temminck, 1820				0	R/LM	1,000
108	Charadriiformes	Laridae	216	Yellow-legged Gull	<i>Larus cachinnans</i> Pallas, 1811				IV	WM/PM	10,000
109	Charadriiformes	Laridae	217	Pallas's Gull	<i>Larus ichthyæetus</i> Pallas, 1773			II	IV	WM	1,000
110	Charadriiformes	Laridae	218	Brown-headed Gull	<i>Larus brunnicephalus</i> Jerdon, 1840	BRS (05)			IV	WM	1,000
111	Charadriiformes	Laridae	219	Black-headed Gull	<i>Larus ridibundus</i> Linnaeus, 1766				IV	WM	0
112	Charadriiformes	Laridae	222	Gull-billed Tern	<i>Gelochelidon nilotica</i> (Gmelin, 1789)			II	IV	WM/R	1,000
113	Charadriiformes	Laridae	224	River Tern	<i>Sterna aurantia</i> J.E. Gray, 1831				IV	R	1,000
114	Charadriiformes	Laridae	232	Little Tern	<i>Sterna albifrons</i> Pallas, 1764			II	IV	WM/R	1,000
115	Charadriiformes	Laridae	235	Black-bellied Tern	<i>Sterna acuticauda</i> J.E. Gray, 1831	NT			IV	R	250

1	2	3	4	5	6	7	8	9	10	11	12
116	Charadriiformes	Laridae	238	Whiskered Tern	<i>Chlidonias hybridus</i> (Pallas, 1811)				IV	WM/R	1,000
117	Charadriiformes	Rynchopidae	243	Indian Skimmer	<i>Rynchops albigollis</i> Swainson, 1838	GT/VU			0	R/LM	60
118	Falconiformes	Accipitridae	244	Brahminy Kite	<i>Haliaeetus indus</i> (Boddaert, 1783)				I	R/LM	0
119	Falconiformes	Accipitridae	246	Pallas's Fish-Eagle	<i>Haliaeetus leucoryphus</i> (Pallas, 1771)	GT/Vu	I	I	I	R	0
120	Falconiformes	Accipitridae	250	Western Marsh-Harrier	<i>Circus aeruginosus</i> (Linnaeus, 1758)				I	WM	0
121	Falconiformes	Accipitridae	252	Greater Spotted Eagle	<i>Aquila clanga</i> Pallas, 1811	GT/Vu	II	I/II	I	WM/R	0
122	Falconiformes	Accipitridae	253	Steppe Eagle	<i>Aquila nipalensis</i> Hodgson, 1833				I	WM	0
123	Falconiformes	Accipitridae	254	Eastern Imperial Eagle	<i>Aquila heliaca</i> Savigny, 1809	GT/Vu	I	I/II	I	WM	0
124	Falconiformes	Pandionidae	255	Osprey	<i>Pandion haliaetus</i> (Linnaeus, 1758)			II	I	WM	0
125	Falconiformes	Falconidae	256	Peregrine Falcon	<i>Falco peregrinus</i> Tunstall, 1771		I	II	I	R/WM	0
126	Coraciiformes	Alcedinidae	262	Small Blue Kingfisher	<i>Alcedo atthis</i> (Linnaeus, 1758)				IV	R	0
127	Coraciiformes	Alcedinidae	266	White-breasted Kingfisher	<i>Halcyon smyrnensis</i> (Linnaeus, 1758)				IV	R/LM	0
128	Coraciiformes	Alcedinidae	269	Black-capped Kingfisher	<i>Halcyon pileata</i> (Boddaert, 1783)				IV	R/LM	0
129	Coraciiformes	Alcedinidae	272	Lesser Pied Kingfisher	<i>Ceryle rudis</i> (Linnaeus, 1758)				IV	R	0
130	Coraciiformes	Meropidae	273	Blue-cheeked Bee-eater	<i>Merops persicus</i> Pallas, 1773				0	SM/PM	0
131	Coraciiformes	Meropidae	274	Blue-tailed Bee-eater	<i>Merops philippinus</i> Linnaeus, 1766				IV	R/WM	0
132	Passeriformes	Hirundinidae	276	Sand Martin	<i>Riparia riparia</i> (Linnaeus, 1758)				0	R	0
133	Passeriformes	Hirundinidae	278	Plain Martin	<i>Riparia paludicola</i> (Vieillot, 1817)				0	R/LM	0
134	Passeriformes	Hirundinidae	279	Common Swallow	<i>Hirundo rustica</i> Linnaeus, 1758				0	WM	0
135	Passeriformes	Hirundinidae	280	Wire-tailed Swallow	<i>Hirundo smithii</i> Leach, 1818				0	R/SM	0
136	Passeriformes	Hirundinidae	281	Red-rumped Swallow	<i>Hirundo daurica</i> Linnaeus, 1771				0	R	0
137	Passeriformes	Hirundinidae	282	Streak-throated Swallow	<i>Hirundo fluviicola</i> Blyth, 1855				0	R	0
138	Passeriformes	Motacillidae	283	White Wagtail	<i>Motacilla alba</i> Linnaeus, 1758				IV	WM	0
139	Passeriformes	Motacillidae	284	Large Pied Wagtail	<i>Motacilla maderaspatensis</i> Gmelin, 1789				IV	R/WM	0
140	Passeriformes	Motacillidae	285	Citrine Wagtail	<i>Motacilla citreola</i> Pallas, 1776				IV	WM	0
141	Passeriformes	Motacillidae	286	Yellow Wagtail	<i>Motacilla flava</i> Linnaeus, 1758				IV	WM	0
142	Passeriformes	Motacillidae	287	Grey Wagtail	<i>Motacilla cinerea</i> Tunstall, 1771				IV	WM	0
143	Passeriformes	Motacillidae	290	Water Pipit	<i>Anthus spinoletta</i> (Linnaeus, 1758)				IV	WM	0
144	Passeriformes	Muscicapidae	296	White-capped Redstart	<i>Chaimarrornis leucocephalus</i> (Vigors, 1831)				IV	WM	0

3.2.vi. Table 3. District wise distribution of wetlands as per LISS-III data

District	Block	Wetland Code	Wetland	Site Code	District	Block	Wetland Code	Wetland	Site Code
Ajmer	Ajmer	177	NW of Todgarh	0	Barmer	Dhorimanna	379	near Gura	0
Ajmer	Ajmer	264	Todgarh	0	Barmer	Dhorimanna	383	near Lahrawa	0
Ajmer	Ajmer	363	cluster of WL near Barakhera	0	Barmer	Sindari	188	Near Buth	0
Ajmer	Ajmer	364	cluster of WL near Barakhera	0	Barmer	Siwana	83	E of Karmawas	0
Ajmer	Ajmer	365	cluster of WL near Barakhera	0	Barmer	Siwana	154	N of Nilkanth	0
Ajmer	Ajmer	366	cluster of WL near Barakhera	0	Barmer	Siwana	159	N of Rakhi	0
Ajmer	Ajmer	367	cluster of WL near Barakhera	0	Barmer	Siwana	212	Rakhi	0
Ajmer	Ajmer	368	cluster of WL near Barakhera	0	Barmer	Siwana	251	SW of Ghana	0
Ajmer	Ajmer	369	cluster of WL near Barakhera	0	Bikaner	Bikaner	9	540 RD	228
Ajmer	Ajmer	370	cluster of WL near Barakhera	0	Bikaner	Bikaner	10	710 RD (ETF)	191
Ajmer	Ajmer	371	cluster of WL near Barakhera	0	Bikaner	Bikaner	11	860 RD	172
Barmer	Balotra	148	N of Kakrala on Kalyanpur Rd.	0	Bikaner	Bikaner	39	Between RD 505-710	264
Barmer	Balotra	185	Navoda near Pachpadra	213	Bikaner	Bikaner	50	Canal side plantation	91
Barmer	Balotra	206	Pachpadra Saline lake	156	Bikaner	Bikaner	52	Chatargarh	210
Barmer	Balotra	265	W of Balotra	0	Bikaner	Bikaner	113	IGNP seepage S of Sarangar	0
Barmer	Balotra	280	W of Mewanagar	0	Bikaner	Bikaner	268	W of Angneu	0
Barmer	Barmer	38	Between Barmer-Utalai	0	Bikaner	Bikaner	338	cluster W of Pugal (IGNP St. I)	0
Barmer	Barmer	142	N of Barmer on Bharka Rd.	0	Bikaner	Bikaner	339	cluster W of Pugal (IGNP St. I)	0
Barmer	Barmer	143	N of Barmer on Bharka Rd.	0	Bikaner	Bikaner	340	cluster W of Pugal (IGNP St. I)	0
Barmer	Barmer	149	N of Khatin	0	Bikaner	Bikaner	341	cluster W of Pugal (IGNP St. I)	0
Barmer	Barmer	350	cluster around Utalai	0	Bikaner	Chohtan	224	S of Gangawara	0
Barmer	Barmer	351	cluster around Utalai	0	Bikaner	Kolayat	12	910 RD	193
Barmer	Barmer	352	cluster around Utalai	0	Bikaner	Kolayat	13	930 Rd	194
Barmer	Barmer	353	cluster around Utalai	0	Bikaner	Kolayat	14	954 Rd near Bajju	271
Barmer	Barmer	354	cluster around Utalai	0	Bikaner	Kolayat	32	Bangasar Lift canal	174
Barmer	Baytu	16	Adjoining Chhitar ka pur	0	Bikaner	Kolayat	40	Between RD 930-961	269
Barmer	Dhorimanna	117	Jushnagar	0	Bikaner	Kolayat	41	Between RD 930-Bhikampur	265
Barmer	Dhorimanna	216	Road side N of Gandhav	0	Bikaner	Kolayat	46	Bhikampur	195
Barmer	Dhorimanna	217	Road side N of Gandhav1	0	Bikaner	Kolayat	88	E of Mankasar1	0
Barmer	Dhorimanna	218	Road side N of Gura	0	Bikaner	Kolayat	89	E of Mankasar2	0
Barmer	Dhorimanna	302	cluster E of Gangawara	0	Bikaner	Kolayat	90	E of Mankasar3	0
Barmer	Dhorimanna	303	cluster E of Gangawara	0	Bikaner	Kolayat	249	SW of Angneu	0
					Bikaner	Lunkaransar	8	507 RD	214
					Bikaner	Lunkaransar	128	Lunkaransar	270

District	Block	Wetland Code	Wetland	Site Code	District	Block	Wetland Code	Wetland	Site Code
Churu	Sujanagarh	98	E of Talchhaper Rly St.	0	Hanumangarh	Hanumangarh	332	cluster SE of Pakka Sarnoka	0
Churu	Sujanagarh	105	Gopalpura	0	Hanumangarh	Hanumangarh	333	cluster SE of Pakka Sarnoka	0
Churu	Sujanagarh	169	NE of Talchhappar Rly. stn.	0	Hanumangarh	Hanumangarh	334	cluster SE of Pakka Sarnoka	0
Churu	Sujanagarh	208	Parihara	0	Jaisalmer	Jaisalmer	3	0 RD Mohangarh	10
Churu	Sujanagarh	263	Tal Chhaper	0	Jaisalmer	Jaisalmer	6	1333 RD	243
Ganganagar	Ganganagar	59	Cluster E of Sadhuwala	0	Jaisalmer	Jaisalmer	7	1356 Escape Reservoir	50
Ganganagar	Ganganagar	60	Cluster E of Sadhuwala	0	Jaisalmer	Jaisalmer	35	Baramsar depression	236
Ganganagar	Sadulsahar	57	Cluster E of Sadhuwala	0	Jaisalmer	Jaisalmer	102	Gadisar Lake	56
Ganganagar	Sadulsahar	58	Cluster E of Sadhuwala	0	Jaisalmer	Jaisalmer	110	IGNP seepage	85
Ganganagar	Sadulsahar	61	Cluster E of Sadhuwala	0	Jaisalmer	Jaisalmer	111	IGNP seepage N of Khinya1	0
Ganganagar	Sadulsahar	62	Cluster E of Sadhuwala	0	Jaisalmer	Jaisalmer	112	IGNP seepage N of Mandha	0
Ganganagar	Sadulsahar	63	Cluster E of Sadhuwala	0	Jaisalmer	Jaisalmer	134	Mohangarh area	89
Ganganagar	Sadulsahar	138	N of Banwali Rly Stn	0	Jaisalmer	Sam	66	Digha Lake	104
Ganganagar	Sadulsahar	139	N of Banwali Rly Stn	0	Jaisalmer	Sam	75	E of Ghotaru1	0
Ganganagar	Sadulsahar	140	N of Banwali Rly Stn	0	Jaisalmer	Sam	76	E of Ghotaru2	0
Ganganagar	Sadulsahar	162	N of Sadulshahr	0	Jaisalmer	Sam	80	E of Juwaye ka tala	0
Ganganagar	Sadulsahar	327	cluster SE of Pakka Sarnoka	0	Jaisalmer	Sam	258	Sultana Lake	78
Ganganagar	Suratgarh	26	Badopal Lake	54	Jaisalmer	Sankra	4	1140 Escape Reservoir	49
Ganganagar	Suratgarh	260	Suratgarh	95	Jaisalmer	Sankra	5	1250 RD-1205 RD	45
Hanumangarh	Hanumangarh	20	Agr Res Stn Hanumangarh	12	Jaisalmer	Sankra	43	Bhaiyana	0
Hanumangarh	Hanumangarh	21	Agr Res Stn Hanumangarh	12	Jaisalmer	Sankra	109	IGNP Seepage E of Ghantiali	0
Hanumangarh	Hanumangarh	22	Agr Res Stn Hanumangarh	12	Jaisalmer	Sankra	130	Mankasar	267
Hanumangarh	Hanumangarh	136	N of Agr Farm Hanumangarh	0	Jalore	Bhinmal	355	cluster near Bhinmal	0
Hanumangarh	Hanumangarh	160	N of Rawatsar	0	Jalore	Bhinmal	356	cluster near Bhinmal	0
Hanumangarh	Hanumangarh	286	W. Rawatsar	0	Jalore	Bhinmal	357	cluster near Bhinmal	0
Hanumangarh	Hanumangarh	294	cltr.IGNP seepage W Rampura	0	Jalore	Bhinmal	358	cluster near Bhinmal	0
Hanumangarh	Hanumangarh	295	cltr.IGNP seepage W Rampura	0	Jalore	Bhinmal	359	cluster near Bhinmal	0
Hanumangarh	Hanumangarh	296	cltr.IGNP seepage W Rampura	0	Jalore	Jaswantpura	285	W of Thur	0
Hanumangarh	Hanumangarh	297	cltr.IGNP seepage W Rampura	0	Jalore	Jaswantpura	387	near road S of Ramsin	0
Hanumangarh	Hanumangarh	298	cltr.IGNP seepage W Rampura	0	Jalore	Raniwara	305	cluster W of Marwar Kori Rly.	0
Hanumangarh	Hanumangarh	328	cluster SE of Pakka Sarnoka	0	Jalore	Raniwara	306	cluster W of Marwar Kori Rly.	0
Hanumangarh	Hanumangarh	329	cluster SE of Pakka Sarnoka	0	Jalore	Raniwara	307	cluster W of Marwar Kori Rly.	0
Hanumangarh	Hanumangarh	330	cluster SE of Pakka Sarnoka	0	Jalore	Raniwara	360	cluster of Karara-Bhinmal Rd.	0
Hanumangarh	Hanumangarh	331	cluster SE of Pakka Sarnoka	0	Jalore	Raniwara	361	cluster of Karara-Bhinmal Rd.	0
Hanumangarh	Hanumangarh				Jalore	Raniwara	362	cluster of Karara-Bhinmal Rd.	0

Geo-spatial Atlas for the Wetland Birds of Thar Desert, Rajasthan

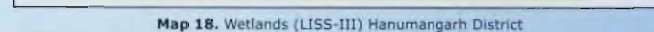
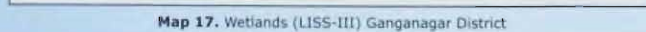
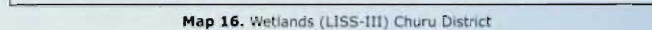
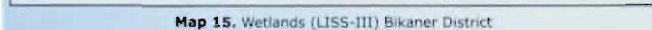
District	Block	Wetland Code	Wetland	Site Code	District	Block	Wetland Code	Wetland	Site Code
Jalore	Sanchole	247	SE of Gangawara	0	Jodhpur	Mandore	23	Akheraj Talab	5
Jalore	Sanchole	299	cluster E of Gangawara	0	Jodhpur	Mandore	30	Balsamand ?	0
Jalore	Sanchole	300	cluster E of Gangawara	0	Jodhpur	Mandore	31	Banar	0
Jalore	Sanchole	301	cluster E of Gangawara	0	Jodhpur	Mandore	36	Barli Dumping site	149
Jalore	Sanchole	304	cluster E of Gangawara	0	Jodhpur	Mandore	115	Jaziwal Pond	19
Jhunjhunun	Jhunjhunun	394	on Kanth R. N of Jasarapura	0	Jodhpur	Mandore	118	Kailana lake	98
Jhunjhunun	Jhunjhunun	396	on Kanth R. N of Jasarapura	0	Jodhpur	Mandore	155	N of Pal	0
Jhunjhunun	udalpurwati	395	on Kanth R. Jasarapura	0	Jodhpur	Mandore	381	near Karani	0
Jodhpur	Balesar	373	near Agolai on Jodhpur Rd.	0	Jodhpur	Mandore	382	near Keru	0
Jodhpur	Balesar	374	near Agolai on Jodhpur Rd.	0	Jodhpur	Mandore	392	on Jodhpur- Narwa Road	0
Jodhpur	Bhopalgarh	25	Asop	0	Jodhpur	Mandore	393	on Jodhpur- Narwa Road	0
Jodhpur	Bhopalgarh	73	E of Gajsinghpura	0	Jodhpur	Osian	74	E of Ghevra	0
Jodhpur	Bhopalgarh	96	E of Surpura Khurd	0	Jodhpur	Osian	127	Lordi	0
Jodhpur	Bhopalgarh	103	Gajsinghpura	0	Jodhpur	Osian	248	SE of Osian	0
Jodhpur	Bhopalgarh	121	Kumhara Tank	4	Jodhpur	Osian	284	W of Thob	0
Jodhpur	Bhopalgarh	145	N of Gajsinghpura	0	Jodhpur	Osian	405	on stream NE of Baorli	0
Jodhpur	Bhopalgarh	157	N of Pipar on Mithri R.	0	Jodhpur	Phalodi	222	S of Baramandla	0
Jodhpur	Bhopalgarh	261	Surpura Khurd	0	Jodhpur	Phalodi	342	cluster around Chirai	0
Jodhpur	Bhopalgarh	266	W of Bhopalgarh	0	Jodhpur	Phalodi	343	cluster around Chirai	0
Jodhpur	Bhopalgarh	269	W of Asop	0	Jodhpur	Phalodi	344	cluster around Chirai	0
Jodhpur	Bhopalgarh	270	W of Asop	0	Nagaur	Degana	65	Dharamsala	0
Jodhpur	Bilara	119	Kaparda-Chopra Rd	0	Nagaur	Degana	250	SW of Dharamsala	0
Jodhpur	Bilara	210	Pichiak lake (Kharla)	196	Nagaur	Degana	274	W of Dharamsala	0
Jodhpur	Bilara	287	adj. Kaparda Rd. E of Palasni	0	Nagaur	Degana	276	W of Harsor	0
Jodhpur	Luni	77	E of Guda Vishnoian	0	Nagaur	Degana	308	cluster E of Jalsu Rly. Stn.	0
Jodhpur	Luni	106	Guda Vishnoian	248	Nagaur	Degana	309	cluster E of Jalsu Rly. Stn.	0
Jodhpur	Luni	192	near Satlana Rly St	0	Nagaur	Degana	310	cluster E of Jalsu Rly. Stn.	0
Jodhpur	Luni	225	S of Guda Vishnoian	0	Nagaur	Degana	311	cluster E of Jalsu Rly. Stn.	0
Jodhpur	Luni	228	S of Kankani	0	Nagaur	Degana	377	near Degana	0
Jodhpur	Luni	380	near Kankani vill.	0	Nagaur	Degana	378	near Degana	0
Jodhpur	Luni	397	on Luni-Kankani Road	0	Nagaur	Didwana	1	N of Kathoti	0
Jodhpur	Luni	412	on stream near Guda Vishnoian	0	Nagaur	Didwana	54	cluster E of Marwar Balia Rly. Stn.	0
Jodhpur	Mandore	15	Adjoining Barli	0					
Jodhpur	Mandore	17	Adjoining Fedusar Rly. Stn.	0					

District	Block	Wetland Code	Wetland	Site Code	District	Block	Wetland Code	Wetland	Site Code
Nagaur	Didwana	55	cluster E of Marwar Balia Rly	0	Nagaur	Mundawa	398	on Sankhas- Bhakrod Rd	0
Nagaur	Didwana	56	cluster E of Marwar Balia Rly	0	Nagaur	Nagaur	79	E of Indana	0
Nagaur	Didwana	64	Deedwana Lake	131	Nagaur	Nagaur	178	Nagaur cluster	0
Nagaur	Didwana	101	E of Near Didwana Rly St.	0	Nagaur	Nagaur	179	Nagaur cluster	0
Nagaur	Didwana	190	near Didwana	0	Nagaur	Nagaur	180	Nagaur cluster	0
Nagaur	Didwana	281	W of Near Didwana Rly St.	0	Nagaur	Nagaur	181	Nagaur cluster	0
Nagaur	Jayal	2	S of Kathoti	0	Nagaur	Nagaur	182	Nagaur cluster	0
Nagaur	Jayal	85	E of Kuchera	0	Nagaur	Nagaur	186	near Basni Belima	0
Nagaur	Jayal	92	E of Rol Qazian	0	Nagaur	Nagaur	187	near Basni Belima	0
Nagaur	Jayal	93	E of Rol Qazian	0	Nagaur	Nagaur	226	S of Indana	0
Nagaur	Jayal	129	Lunsara	0	Nagaur	Nagaur	231	S of Nagaur adjcent. Mundwa Ri	0
Nagaur	Jayal	194	North of Lunsara	0	Nagaur	Nagaur	232	S of Nagaur adjcent. Mundwa Ri	0
Nagaur	Jayal	195	on Jayal Rol Qazian Rd.	0	Nagaur	Parvatsar	100	East of Parvatsar	0
Nagaur	Jayal	196	on Kuchera Mundwa Rd.	0	Nagaur	Parvatsar	108	Harsor	0
Nagaur	Jayal	220	Rol Qazian	0	Nagaur	Parvatsar	256	South of Parvatsar	0
Nagaur	Kuchaman	252	Sambhar lake	249	Nagaur	Rian	42	Bhairunda	0
Nagaur	Makrana	27	Bajoli	0	Nagaur	Rian	67	Dodiyana	0
Nagaur	Makrana	51	Chandarun	0	Nagaur	Rian	125	Lampolai	0
Nagaur	Merta	91	E of Marwar Chapari Rly St	0	Nagaur	Rian	126	Lampolai-Ren Road	0
Nagaur	Merta	133	Merta-Ren Road	0	Nagaur	Rian	131	Merta-Lampolai Road	0
Nagaur	Merta	215	Ren	0	Nagaur	Rian	132	Merta-Lampolai Road	0
Nagaur	Merta	345	cluster around Merta	44	Nagaur	Rian	144	N of Dodiyana	0
Nagaur	Merta	346	cluster around Merta	44	Nagaur	Rian	152	N of Kuraki	0
Nagaur	Merta	347	cluster around Merta	0	Nagaur	Rian	153	N of Lampolai	0
Nagaur	Merta	349	cluster around Merta	44	Nagaur	Rian	171	NW of Bhairunda	0
Nagaur	Mundawa	44	Bhakrod	0	Nagaur	Rian	203	On stream NE of Kuraki	0
Nagaur	Mundawa	45	Bhawanda	0	Nagaur	Rian	207	Padu Kalan	0
Nagaur	Mundawa	72	E of Bhakrod	0	Nagaur	Rian	267	W of Govindgarh	0
Nagaur	Mundawa	164	NE of Bhawanda	0	Nagaur	Rian	273	W of Dhaneriya	0
Nagaur	Mundawa	165	NE of Bhawanda	0	Nagaur	Rian	348	cluster around Merta	44
Nagaur	Mundawa	166	NE of Bhawanda	0	Nagaur	Rian	414	on strean NE of Kuraki	0
Nagaur	Mundawa	229	S of Khimsar	0	Pali	Bali	48	Bijapur	0
Nagaur	Mundawa	230	S of Khimsar	0	Pali	Bali	49	Bisalpur	0
Nagaur	Mundawa	279	W of Kuchera	0	Pali	Bali	70	E of Bera	0

Geo-spatial Atlas for the Wetland Birds of Thar Desert, Rajasthan

District	Block	Wetland Code	Wetland	Site Code	District	Block	Wetland Code	Wetland	Site Code
Pali	Bali	114	Jawai Bandh	39	Pali	Jaitaran	175	NW of Ras	0
Pali	Bali	172	NW of Chamanderi	0	Pali	Jaitaran	197	on Kuraki-Ras Road	0
Pali	Bali	174	NW of Keshavganj Rly. St.	0	Pali	Jaitaran	202	on stream N of Bupra	0
Pali	Bali	183	Nana	0	Pali	Jaitaran	214	Ras	0
Pali	Bali	233	S of Nana	0	Pali	Jaitaran	238	S of Ras	0
Pali	Bali	245	SE of Bera	0	Pali	Jaitaran	399	on Stream E of Ras	0
Pali	Bali	246	SE of Bera	0	Pali	Jaitaran	404	on stream Kuraki	0
Pali	Bali	293	between Bera-Bijapur	0	Pali	Kharchi	47	Bhinwalia	0
Pali	Bali	313	cluster E of Jawai Bandh	0	Pali	Kharchi	156	N of Phulad Rly Station	0
Pali	Bali	318	cluster E of Sewari	0	Pali	Kharchi	209	Phulad	68
Pali	Bali	319	cluster E of Sewari	0	Pali	Kharchi	213	Rampura Bhinwalia Rd	0
Pali	Bali	320	cluster E of Sewari	0	Pali	Kharchi	257	Sriari	0
Pali	Bali	335	cluster W of Nana	0	Pali	Kharchi	411	on stream near Dhanla	0
Pali	Bali	336	cluster W of Nana	0	Pali	Pali	37	Bawari	0
Pali	Bali	337	cluster W of Nana	0	Pali	Pali	87	E of Manihari	0
Pali	Bali	401	on stream E of Bijapur	0	Pali	Pali	107	Gundoj Dam Reservoir	86
Pali	Bali	402	on stream E of Bijapur	0	Pali	Pali	120	Kharda Dam Reservoir	62
Pali	Desuri	124	Lampi (Raipur)	117	Pali	Pali	146	N of Gura Endla	0
Pali	Desuri	239	S of Sadri	0	Pali	Pali	277	W of Hemawas Reservoir	0
Pali	Desuri	254	Shanderao	0	Pali	Pali	288	adj. Manihari-Hemawas Rd.	0
Pali	Desuri	259	Sumer	115	Pali	Pali	389	on stream near Nimbara	0
Pali	Desuri	283	W of Sadri	0	Pali	Raipur	33	Bar	0
Pali	Desuri	400	on Stream S of Sadri	0	Pali	Raipur	34	Bar-Raipur Road	0
Pali	Desuri	403	on stream E of Shanderao	0	Pali	Raipur	68	E of Asarlal on Lirli River ?	0
Pali	Desuri	410	on stream near Desuri	0	Pali	Raipur	78	E of Haripur Rly St	0
Pali	Jaitaran	24	Asarlaj	0	Pali	Raipur	141	N of Bar	0
Pali	Jaitaran	28	Balara	0	Pali	Raipur	150	N of Kotra	0
Pali	Jaitaran	29	Balra-Kuraki Rd	0	Pali	Raipur	151	N of Kotra	0
Pali	Jaitaran	86	E of Lambiya	0	Pali	Raipur	170	NW of Bar	0
Pali	Jaitaran	122	Kuraki	0	Pali	Raipur	184	Nanar (Raipur)	118
Pali	Jaitaran	123	Lambiya	0	Pali	Raipur	189	near Chandawal	0
Pali	Jaitaran	137	N of Asarlaj	0	Pali	Raipur	193	North of Chandawal Rly St	0
					Pali	Raipur	198	on Stream Guriya Rly St	0
					Pali	Raipur	236	S of Raipur	0

District	Block	Wetland Code	Wetland	Site Code	District	Block	Wetland Code	Wetland	Site Code
Pali	Raipur	240	S of Sendra Rly St	0	Sikar	Nim Ka Thana	191	near Dipas	0
Pali	Raipur	244	SE of Babra	0	Sikar	Nim Ka Thana	199	on Stream near Raipur	0
Pali	Raipur	271	W of Bali	0	Sikar	Nim Ka Thana	223	S of Dabra Rly St.	0
Pali	Raipur	272	W of Bubra	0	Sikar	Nim Ka Thana	227	S of Jhilo Rly. St.	0
Pali	Raipur	290	adjoining Raipur-Nimbaj Rd.	0	Sikar	Nim Ka Thana	237	S of Raipur	0
Pali	Raipur	292	adjoining stream W of Chitar	0	Sikar	Nim Ka Thana	275	W of Dipas	0
Pali	Raipur	372	east of Kelwad	0	Sikar	Nim Ka Thana	324	cluster NE of Chhawan	0
Pali	Raipur	375	near Chitar	0	Sikar	Nim Ka Thana	325	cluster NE of Chhawan	0
Pali	Raipur	384	near road N of Kelwad	0	Sikar	Nim Ka Thana	326	cluster NE of Chhawan	0
Pali	Raipur	388	near stream S of Kelwad	0	Sikar	Nim Ka Thana	406	on stream S of Mavanda Rly. St	0
Pali	Rohit	135	N E of Kharda	0	Sikar	Sri Madhopur	201	on stream SW of Hathidae	0
Pali	Rohit	176	NW of Rohat Rly. stn.	0	Sirohi	Revdar	167	NE of Methipura	0
Pali	Rohit	200	on stream N of Mandawas	0	Sirohi	Revdar	385	near road N of Methipura	0
Pali	Rohit	205	on stream near Vayad	0	Sirohi	Revdar	386	near road N of Methipura	0
Pali	Rohit	219	Rohat	0	Sirohi	Revdar	413	on stream near Revdar	0
Pali	Rohit	282	W of Rohat Rly. stn.	0	Sirohi	Shivganj	234	S of Palri	0
Pali	Rohit	289	adjoining Mithri NW of Rohat	0	Sirohi	Shivganj	312	cluster E of Jawai Bandh	0
Pali	Rohit	291	adjoining Rohat Rly. Stn.	0	Sirohi	Shivganj	314	cluster E of Jawai Bandh	0
Pali	Rohit	376	near Chotila vill.	148	Sirohi	Shivganj	315	cluster E of Jawai Bandh	0
Pali	Sojat city	53	Chopra	0	Sirohi	Shivganj	316	cluster E of Jawai Bandh	0
Pali	Sojat city	81	E of Kantaliya	0	Sirohi	Shivganj	317	cluster E of Jawai Bandh	0
Pali	Sojat city	94	E of Rupawas	0	Sirohi	Shivganj	409	on stream W of Palri	0
Pali	Sojat city	95	E of Sardarsamand	0	Sirohi	Sirohi	69	E of Belangri	0
Pali	Sojat city	147	N of Jadon	0	Sirohi	Sirohi	168	NE of Sirohi	0
Pali	Sojat city	161	N of Rupawas	0	Sirohi	Sirohi	241	S of Sirohi	0
Pali	Sojat city	204	on stream near Kantaliya	0	Sirohi	Sirohi	262	SW of Belangri	0
Pali	Sojat city	221	Rupawas	0	Sirohi	Sirohi	321	cluster E of Sirohi	0
Pali	Sojat city	253	Sardarsamand	70	Sirohi	Sirohi	322	cluster E of Sirohi	0
Pali	Sojat city	255	Sojat	0	Sirohi	Sirohi	323	cluster E of Sirohi	0
Pali	Sumerpur	99	E of Chanod	0	Sirohi	Sirohi	390	on Balangiri-Mandwara Rd	0
Sikar	Khendala	82	E of Kanwat	0	Sirohi	Sirohi	407	on stream S of Padiv	0
Sikar	Nim Ka Thana	71	E of Bhagega Rly. St.	0	Sirohi	Sirohi	408	on stream SE of Mandwara	0
Sikar	Nim Ka Thana	104	Ganwar	0					
Sikar	Nim Ka Thana	158	N of Raipur	0					
Sikar	Nim Ka Thana	173	NW of Dipas	0					





Map 19. Wetlands (LISS-III) Jaisalmer District



Map 20. Wetlands (LISS-III) Jalore District



Map 21. Wetlands (LISS-III) Jhunjhununu District



Map 22. Wetlands (LISS-III) Jodhpur District



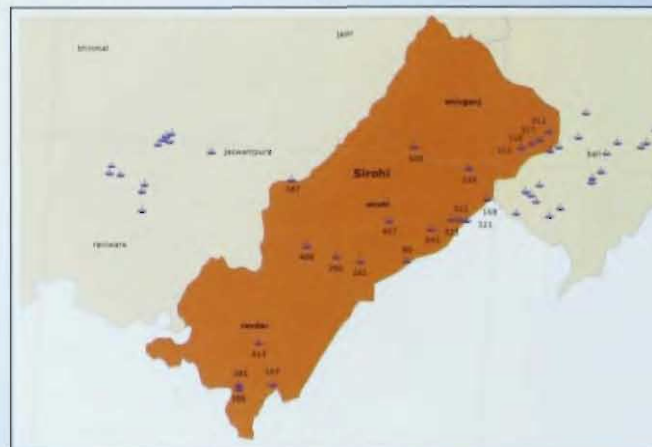
Map 23. Wetlands (LISS-III) Nagaur District



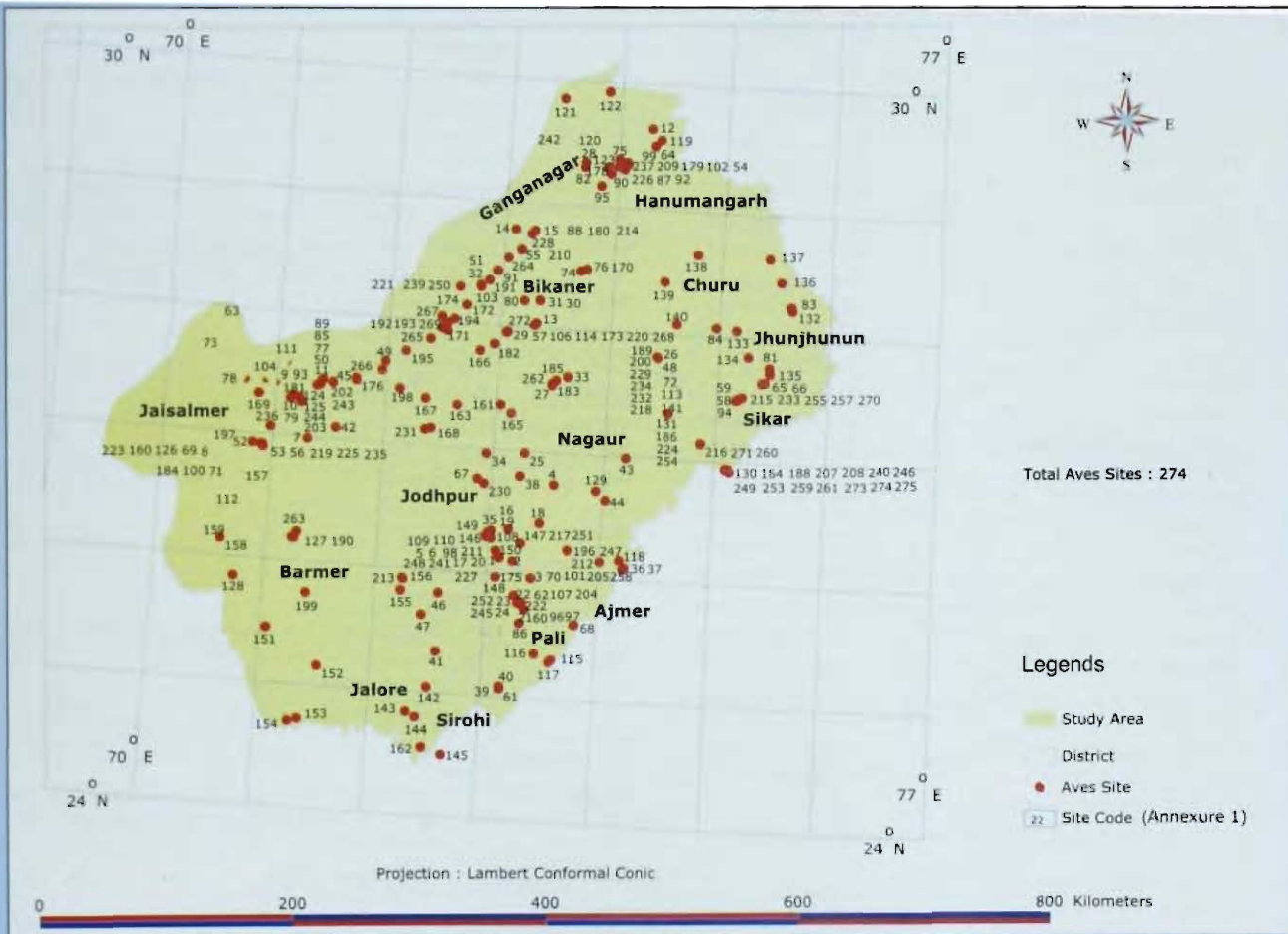
Map 24. Wetlands (LISS-III) Pali District



Map 25. Wetlands (LISS-III) Sikar District



Map 26. Wetlands (LISS-III) Sirohi District



Map 27. Study Area Aves Sites

3.3 Terms and abbreviations used:

♂	Male
♀	Female
C	Carnivorous
H	Herbivorous
O	Omnivorous
juv.	Juvenile
imm.	Immature
br	Breeding
nbr	Non-breeding
GT	Globally Threatened
Cr	Critical
En	Endangered
Vu	Vulnerable
CD	Conservation Dependent
NT	Near Threatened
DD	Data Deficient
DEC	Declining
EXT	Extinct
INC	Increasing
STA	Stable
E	Endemic
RRS	Restricted-Range Species
BRS	Biome-Restricted Species
R	Resident
R/LM	Resident with local movements
R/LM/SM	Resident with local as well as summer movements
R/AM	Resident with altitudinal movements
R/AM/WM	Resident with altitudinal movements as well as with winter influx
R/SM	Resident with summer influx
R/SM/WM	Resident with summer and winter movements
R/WM	Resident with winter influx

R/WM/AM	Resident with winter influx as well as altitudinal movements
R/WM/SM	Resident with winter influx as well as summer movements
R/WM/LM	Resident with winter influx as well as local movements
R/WM/PM	Resident with winter influx as well as passage movements
R/AM/WM/PM	Resident with altitudinal, winter and passage movements
WM	Winter migrant
WM/R	Largely winter migrant and partly resident
WM/PM	Winter migrant as well as passage migrant
PM	Passage migrant
VCom	Very common
Com	Common
LCom	Locally common
UnCom	UnCommon
Ra	Rare
VRa	Very rare
Va	Vagrant
?	Status not known
2	Andaman
6	Assam Plains
05	Eurasian High Montane (Alpine and Tibetan)
08	Sino-Himalayan Sub-tropical Forest
09	Indo-Chinese Tropical Moist Forests
11	Indo-Malayan Tropical Dry Zone

3.4. Glossary:

R/LM	denotes a species resident in India throughout the year, which however, undertakes local movements depending on water conditions.
R/AM	denotes a species resident in India throughout the year, which however, undertakes altitudinal migration from plains of India to Himalayas in different seasons.

R/WM or WM/R : denotes a species, which is also resident in India; however, influx of the migratory population from the Palaearctic takes place in winter.

WM : a winter migrant to India, which breeds in Eurasia and visits India in winter.

Cr : taxons facing an extremely high risk of extinction in the wild in the immediate future.

GT : a species listed threatened at Global level as per IUCN criteria

NT : a species that falls just outside the threat criteria but which requires monitoring for early evidence of deteriorating status.

En : a taxon is Endangered when it is not Critical but facing a very high risk of extinction in the wild in the near future.

Ex : a taxon is Extinct when there is no reasonable doubt that its last individual has died.

Vu : a taxon is Vulnerable when it is not Critical or Endangered but is facing a high risk of extinction in the wild in the medium-term future.

Va : a very rare or vagrant species, which has been recorded from India only on a few occasions in the last more than fifty years or so.

VRa : only very few birds recorded regularly.

Ra : flocks of 5-20 birds recorded regularly.

UnCom : flocks of 20-50 birds recorded regularly.

Com : flocks of more than 50 birds recorded regularly.

V Com : flocks of hundreds/ thousands of birds, though sometimes, seasonally recorded regularly.

Adult : a bird that has attained its definitive plumage.

Altitudinal migrant : a species that breeds in high altitudes and moves to lower altitudes in non-breeding season.

Alula : the small 'bastard' wing on the leading edge of the wing used to control stall tendency at very low speed.

Aquatic : frequenting water.

Axillaries : feathers of the 'armpit' at the base of the underwing or under the wings near the body.

Biotope : an area with uniform environment, flora and fauna.

Breeding plumage : a different plumage acquired by many species during the breeding season.

Cap : a well-defined patch of colour or bare skin on the top of the head.

Carpal joint : the small bones of the 'wrist' joint.

Circumpolar : of or inhabiting the Arctic (or Antarctic) regions in both the Eastern and Western hemisphere.

Collar : a well-defined band of colour which encircles or partly encircles the neck.

Colonial : nesting in groups or colonies rather than in isolated pairs.

Contour feather : any feather forming part of the outer surface of the bird's plumage.

Cosmopolitan : Worldwide in distribution or at least occurring on all continents except Antarctica.

Coverts : the contour feathers that overlap the main wing or tail feathers.

Crepuscular : active at dusk.

Crest : a tuft of elongated feathers on the crown.

Crown : the top of the head.

Cryptic : of form or colouring that serve to conceal.

Culmen : the ridge of the upper mandible.

Cursorial : adapted to running, a ground-dwelling species.

Decurved or downcurved : curved downward.

Dimorphic : of species or sexes having two colour forms.

Diurnal : active during the day.

Eclipse : dull female-like plumage of male ducks (drakes) for a period after the breeding season.

Edges : outer feather margins, which can frequently result in distinct colour on wings or tail.

Endemic : restricted to certain area or region.

Eyebrow or supercilium : a conspicuous stripe of colour running above but not through the eye.

Eye ring : feathered ring immediately surrounding the orbital ring.

Eye stripe : a stripe that runs horizontally from the base of the bill through the eye and beyond.

Feral: escaped from captivity and now established and self-supporting in the wild.

Filoplume: a thin, hair like feather.

Flight feathers: the long well developed feathers of the wings and tail used during flight. The flight feathers of the wings are divided into primaries and secondaries of wings.

Fringes: complete feather margins, which can frequently result in a scaly appearance to body feathers or wing coverts.

Frontal shield: a fleshy, featherless and often brightly coloured area on the forehead.

Fulvous: tawny, dull yellowish-red or red wine coloured.

Gape: the mouth and fleshy corner of the bill, which can extend back below the eye.

Gregarious: a species often found in flocks when feeding in the non-breeding period, etc.

Gular pouch: a loose and pronounced area of skin extending from the throat.

Holarctic: occurring in both the Palaearctic and Nearctic regions, i.e., in northern and temperate regions of both New and Old Worlds.

Immature: a bird in a plumage in between juvenile and adult.

Iris: the coloured membrane which surrounds the pupil of the eye and which can be brightly coloured.

Jheel: a shallow lake in a low-lying natural depression, usually with floating and submerged vegetation, reed beds and partially submerged trees.

Juvenile: a bird in its first plumage that replaces the downy one.

Leading edge: the front edge of the forewings.

Leg projection: indicates that part of the legs project beyond the tail when the bird is in flight.

Local: occurring or common within a small or restricted area.

Lores: the area between the eye and the base of the bill sometimes distinctively coloured.

Mandible: the lower or upper half of the bill.

Mantle: the back of a bird together with the upper surface of the wings.

Mask: a dark area of plumage surrounding the eye and often covering the ear-coverts.

Migrant: a bird that regularly passes through an area on its way to or from its normal breeding range.

Mirrors: white spots or areas in the black wing tips.

Moult: the process of shedding and replacing feathers.

Nape: back of neck.

Nocturnal: a species active at night.

Nomadic: wandering or erratically occurring species, which has no fixed territory when not breeding.

Non-breeding plumage: plumage worn by birds when not breeding.

Nuchal: relating to the hind neck, used with reference to a patch or collar.

Nuptial: pertaining to breeding season.

Ochre: yellowish-brown.

Omnivorous: eating almost any kind of plant and animal food.

Ornithology: the study of birds.

Palaearctic: the zoogeographical region of Eurasia.

Passage migrant: a species that regularly passes through an area during migration without remaining there for either breeding or non-breeding season.

Pelagic: frequenting the deep or open ocean.

Phase: also **morph:** denotes a particular form of the species where a colour variation exists, e.g. dark phase, grey phase.

Plume: a feather larger or longer than the feathers around it, generally used in display.

Polygamy: the formation of a sexual bond between one male and more than one female.

Primaries: the outermost and longest flight feathers on a bird's wing, usually numbering 11.

Race or subspecies: a geographical population of a species that is slightly different from other populations of that species.

Range: the geographical area or areas inhabited by a species.

Rectrices: the tail feathers.

Recurved or upcurved: bent upwards.

Remiges: the primary and secondary wing feathers.

Resident: staying in one place all the year, non-migratory.

Ringling: the marking of bird by placing rings of metal or coloured plastic on their legs for future recognition as individual.

Roosting: the bird is said to be roosting when either actually sleeping or resting for more than a brief nap.

Rufous: reddish-brown.

Rump: lower back and base of tail.

Scapulars: a group of feathers on the shoulder.

Secondaries: the large flight feathers along the rear edge of the wing, inward from the primaries.

Sedentary: resident, but scarcely moving from the immediate vicinity of its birthplace.

Spatulate: spoon-shaped.

Speculum: a distinctively coloured area on the wings of a bird, especially the metallic-coloured patch on the secondaries of some ducks.

Subadult: young birds, with a mixture of immature and adult plumage, the last stage before full adult plumage.

Subarctic: superficially arctic regions (not necessarily within the Arctic Circle) where the ground is not permanently frozen and which can support small trees.

Subterminal band: a dark or pale band, usually broad, at the tip of a feather or feather tract (especially the tail).

Tarsus: the lower, usually featherless, part of a bird's leg above the feet.

Taxonomy: the science of classification of organisms.

Tertials or tertiaries: the innermost flight feathers on a bird's wing, immediately adjacent to the body.

Trailing edge of wing: the rear edge of an extended wing.

Tundra: vast, treeless regions that make up most of N Russia, with arctic climate and vegetation.

Underparts: under surface of body from throat to undertail-coverts.

Upperparts: upper surface of body including wings and tail.

Vagrant or accidental: a definition of scarcity applied to birds which leave their normal range to make infrequent visits to the area in question.

Vent: the area around the cloaca (anal opening) just behind the legs (should not to be confused with the under-tail-coverts).

Vermiculation: irregular, wavy marking, reminiscent of tracks made by worms.

Vinaceous: red wine-coloured.

Wattle: a lobe of bare, often brightly coloured skin attached to the head.

Wing-bar: a line across the wing contrasting in colour with the rest of it.

Wing projection: used to describe the projection of the tip of the primaries beyond the tail when a bird is at rest.

4. Results

A total of 144 wetland bird species have been recorded from 275 sites during the present studies. Point records have been plotted for each site. The information has been used to generate geo-spatial distribution maps for each species using Lambert Conformal Conic Projection on base map of scale of 1:1000000 of the Thar Desert. The set of two maps for each species pin point the present extent of distribution of the species in the area and provide the number of individuals of a species at a specific site. The above data provides information for the formulation of management plans for the identified prioritised wetlands, as well as for the threatened and other key species.

4.1. Priority wetlands in the Thar Desert

4.1.i.) Potential wetlands of International importance with reference to Ramsar criteria:

Based on Ramsar criteria 2 and 6, a total of 25 wetlands meet the requirements for inclusion as wetlands of international importance under the Ramsar list of Sites. Of these, Sardar Samand (Dist. Pali) has highest aggregate of 44 points with 9 GT species and 7 species eligible for 1% criterion, it is more than double of the next wetland, i.e., Sambhar Lake (Dist. Nagaur) with 19 points, Badopal (Dist. Hanumangarh) with 17 points, followed by Talchapar (Dist. Churu) (12 points) and Kharda Dam (Dist. Pali) (10 points) to name a few (table 4, Chart 1). Of these, only Sambhar

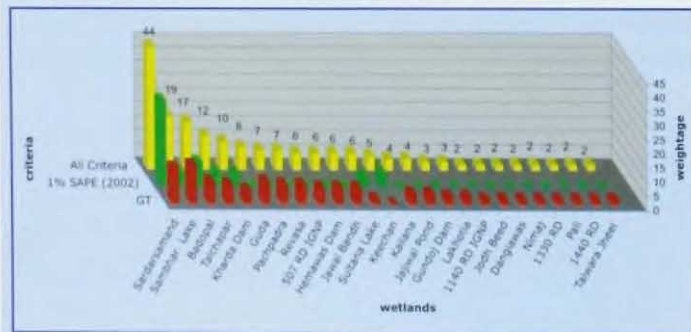


Chart 1. Prioritised Potential Ramsar Sites in Thar Desert, Rajasthan

Lake is presently a Ramsar site (1990, Ramsar site no. 464). No other site is so far included even under list of wetlands identified under national wetland conservation programme by Ministry of Environment & Forests (2003). In a recent study Vijayan, *et al.* (2004) have also identified the following three wetlands, in order of rank, from the Thar Desert, namely Sardarsamand, Jawai dam and Kharda dam as potential Ramsar sites. They also counted 20,098 birds from Sardarsamand, thus also meeting the requirement of Ramsar criterion 5 to qualify it as a wetland of international importance.

Table 4. Prioritised potential Ramsar sites in Thar Desert, Rajasthan. based on criteria: GT and 1% SAPE

Priority	Bird_sites	GT	1% SAPE (2002)	weightage
1	Sardarsamand	13	31	44
2	Sambhar Lake	14	5	19
3	Badopal	8	9	17
4	Talchapar	7	5	12
5	Kharda Dam	5	5	10
6	Guda	8	0	8
7	Pachpadra	7	0	7
8	Revasa	7	0	7
9	507 RD IGNP	6	0	6
10	Hemawas Dam	6	0	6
11	Jawai Bandh	6	0	6
12	Sultana Lake	2	4	6
13	Keechan	0	5	5
14	Kailana	4	0	4
15	Jajiwai Pond	4	0	4
16	Gundoj Dam	3	0	3
17	Lakhotia	3	0	3
18	1140 RD IGNP	2	0	2
19	Jodh Beed	2	0	2
20	Danglawas	2	0	2
21	Nimaaj	2	0	2
22	1330 RD	2	0	2
23	Pali	2	0	2
24	1440 RD	2	0	2
25	Talwara Jheel	2	0	2

It is noteworthy that the Pali district has maximum number of potential Ramsar sites (8), namely, Sardarsamand, Hemawas, Kharda, Gundoj, Lakhotia, Nimaj, Pali and Jawai Bandh. The adjoining district of Jodhpur also has 5 potential Ramsar sites, namely Jajiwai, Guda, Dangiawas, Kailana and Keechan while the district of Jaisalmer has 4 potential Ramsar sites, namely Sultana Lake, 1140 RD, 1330 RD and 1440 RD along IGNP; while two sites are located in district of Bikaner, namely, 507 RD IGNP and Jodh Beed and one each in the districts of Barmer (Pachpadra), Nagaur (Sambhar Lake), Churu (Talchappar), Hanumangarh (Badopal) and Sikar (Revasa) (map 32).

In the present atlas an attempt has also been made to prepare geo-referenced site maps of the Globally Threatened species in the Thar Desert. It indicates that GT/CR species are recorded from 10 sites, GT/VU from 38 sites (map 28), and NT species from 51 sites. The 1% biogeographic population of two species, namely Sociable Lapwing and Demoiselle Crane is recorded from 8 sites (map 38).

Special attention need to be paid to the following wetlands, namely, Badopal, Sambhar and Talchappar for protection of Sociable Lapwing, *Vanellus gregarius* as all the above sites hold 1% of the biogeographic

Table 5. Prioritised wetlands in Thar Desert, Rajasthan based on the cumulative weightage of criteria: GT, 1% SAPE, IW (P) Act, CITES & CMS. Numbers in () indicates total number of species.

Priority	Wetland	Bird sites	GT	1% SAPE (2002)	IWL(P)Act	CITES	CMS	Sum all Criteria
1	Sardarsamand (52)	3,70, 101,205, 258	13 (9)	31 (7)	10 (2)	20 (6)	86 (26)	160
2	Sambhar Lake (54)	130,164,207,208,240,246, 249,259,261, 273,274, 275	14 (7)	5 (1)	10 (2)	17 (5)	92 (28)	138
3	Talchappar (61)	26,48, 113, 141,181, 189, 200, 218,229,232,234	7 (2)	5 (1)	20 (4)	15 (5)	70 (22)	117
4	Kailana (46)	5,6,98,109,110,146	4 (3)	0	10 (2)	6 (2)	88 (28)	108
5	Guda (33)	1,20,175,241,248	8 (5)	0	10 (2)	13 (3)	72 (22)	103
6	Gajner (44)	29,57,106,114,173,220,268	1 (1)	0	15 (3)	6 (2)	74 (24)	96
7	Badopal (45)	54,92,102,179,209,236,237	8 (4)	9 (2)	0	6 (2)	71 (23)	94
8	Pachpadra (45)	156,213	7 (5)	0	5 (1)	9 (3)	71 (24)	92
9	507 RD IGNP(51)	15,88,180,214	6 (4)	0	5 (1)	6 (2)	70 (22)	87
10	Kharda Dam (44)	22,62,107,204	5 (4)	5 (1)	5 (1)	9 (3)	51 (17)	75
11	Hemawas Dam (36)	21,60,96,97	6 (5)	0	5 (1)	12 (4)	39 (13)	62
12	1140 RD IGNP(18)	49	2 (1)	0	10 (2)	9 (3)	38 (12)	59
13	Jawai bandh (29)	39,61	6 (5)	0	5 (1)	9 (3)	32 (10)	52
14	Gundoj Dam (17)	86	3 (3)	0	5 (1)	8 (4)	32 (10)	48
15	Lordia (26)	23	1 (1)	0	5 (1)	3 (1)	36 (12)	45
16	1356 RD IGNP (26)	11,17,50	0	0	0	3 (1)	39 (13)	42
17	Jajiwai Pond (19)	16,19	4 (2)	0	5 (1)	6 (2)	23 (7)	38
18	Lunkaransar (13)	76	0	0	5 (1)	6 (2)	21 (7)	32

population of this critically endangered species (Sangha, 2005). Another site which invites our attention is Keechan (Dist. Jodhpur), which also hold 1% of the biogeographic population of Demoiselle Crane, *Grus virgo* (Rahmani, 1997) with a count of 4,000 birds and thus qualifies Ramsar criterion 6.

4.1.ii) Potential wetlands of National and International importance with reference to Indian WL (P) Act, 1972, CITES and CMS

An attempt has been made to further assess the conservation value of the wetlands by adding the criteria value of the list of species under schedule I of WL (P) Act, 1972, under appendices I and II of CITES, and I/II, II of CMS. The maximum value was obtained for Sardarsamand (160 points), followed by Sambhar lake (138 points), Talchapar (117 points), Kailana (108 points) and so on so forth (table 5). The individual values were further moderated in accordance to their ranking and are presented in table 6. The histogram for first 18 such wetlands is shown in Chart 2, which indicate relative biodiversity value of the above wetlands.

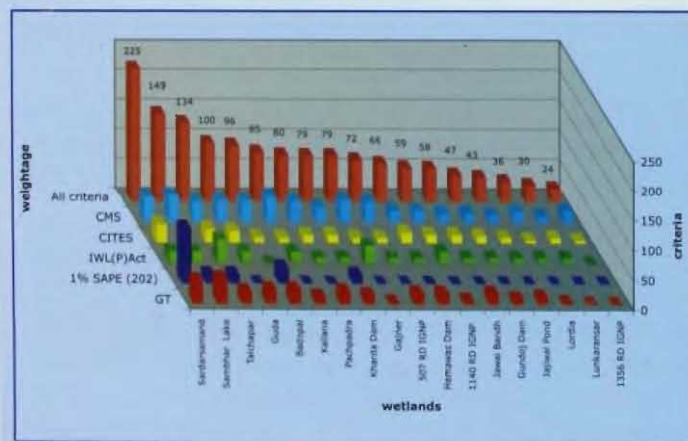


Chart 2. Prioritized wetlands in Thar Desert, Rajasthan

The Atlas presents geo-referenced site maps of the Species under Schedule I of Wild Life (P) Act, 1972, which are recorded from 106 sites (map 30), CMS Appendix I/II (55 sites) & II (144 sites) (map 29), CITES Appendix I (7 sites) and II (78 sites) (map 31).

Table 6. List of prioritised wetlands in the Thar Desert based on application of consolidation of five criteria.

Priority	Name of wetland (district)	All criteria	Criteria used				
			GT	1% SAPE (202)	WL(P) Act	CITES	CMS
1	Sardarsamand (Pali)	225	39	93	20	30	43
2	Sambhar Lake (Nagaur)	149	42	15	20	26	46
3	Talchapar (Churu)	134	21	15	40	23	35
4	Guda (Jodhpur)	100	24	0	20	20	36
5	Badopal (Hanumangarh)	96	24	27	0	9	36
6	Kailana (Jodhpur)	85	12	0	20	9	44
7	Pachpadra (Barmer)	80	21	0	10	13.5	35.5
8	Kharda Dam (Pali)	79	15	15	10	13.5	25.5
9	Gajner (Bikaner)	79	3	0	30	9	37
10	507RDIGNP (Bikaner)	72	18	0	10	9	35
11	Hemawas Dam (Pali)	66	18	0	10	18	20
12	1140RDIGNP (Jaisalmer)	59	6	0	20	14	19
13	Jawal Bandh (Pali)	58	18	0	10	14	16
14	Gundoj Dam (Pali)	47	9	0	10	12	16
15	Jajjwal Pond (Jodhpur)	43	12	0	10	9	12
16	Lordia (Pali)	36	3	0	10	5	18
17	Lunkaransar (Bikaner)	30	0	0	10	9	11
18	1356 RD IGNP (Jaisalmer)	24	0	0	0	4.5	19.5
	100%	30%	30%	20%	15%	5%	

4.1.iii) Consolidated listing of wetlands of National and International importance

Based on consolidated value of all five criteria to identify important prioritised wetlands in the Thar Desert as described above, a total of six wetlands are located in Pali, three each in Jodhpur and Bikaner, two in Jaisalmer and one each in Hanumangarh, Churu, Nagaur and Barmer (table 6, map 33).

4.1.iv) The Indira Gandhi Nahar Pariyojna:

The canal system of the Indira Gandhi Nahar Pariyojna (IGNP) scheme that supplies fresh water to the Thar Desert from Hari-ke-barrage in Punjab has played a crucial role in changing landscape of the Thar Desert and thus resulted in the introduction of a number of forest and wetland birds in the area. The distribution maps of the waterbirds generated in present study indicate concentration of bird sites in and around the command area of IGNP. During the present study, out of 18 prioritised wetlands in the Thar Desert six have been found to be around the IGNP. Similarly out of 25 potential Ramsar sites identified in the Thar Desert in the current study eight are around the IGNP. The number of important sites is likely to go up further once stage II of IGNP is fully commissioned. Since the IGNP is still not fully operational and further ecological changes are likely to occur in the future, the present species distribution maps can be used as a bench mark for monitoring and surveillance of waterbirds in the future with changing landscape in the Thar.

4.2 Review of the adequacy of the Indian Wild Life (Protection) Act, 1972 vis-à-vis wetland birds

The Indian Wild Life (Protection) Act, 1972 (as amended up to 2003) has been enacted for the conservation of nationally and internationally endangered species and control of trade in wild life. The Act also provides a basis for implementation of CITES to which India is a signatory.

A total of nine Globally Threatened wetland birds (BirdLife International, 2004) are recorded in the Thar Desert. Of these, Sociable Lapwing is Critically threatened (GT/CR) while the remaining eight are Vulnerable (GT/VU). Out of the nine species, three are raptor species, which are wetland dependant birds. A closer look at the list of GT species indicate,

though all the three raptor species are listed under schedule I, five of six waterbirds are listed under schedule IV of IW(P) Act, 1972, while Indian Skimmer, *Rynchops albicollis*, is not included in any schedule, thus finds no protection under the Act (Annexure 3). Similarly Sarus Crane, *Grus antigone* which is being threatened vigorously in its range because of various reasons is also listed under schedule IV. It leads one to think whether the Indian waterbirds need more protection under the Act, either by up-gradation of the current listing of schedules of the threatened species or by inclusion of a larger number of species under it.

4.3. Susceptibility of domestic and wild bird species to the H5N1 Asian strain

World Organization for Animal Health (OIE)The UN Food and Agriculture Organisation (FAO) and confirm that movement of poultry, cage birds and migratory species play a role in the transmission and spread of highly pathogenic avian H5N1 influenza virus are essentially domestic and wild birds. Although some fifty non-domestic bird species have proved susceptible to infection with the virus, it would appear from the epidemiological data currently available that, among the wild birds implicated in the trans-boundary spread of the virus, ducks could play a major role. Joint FAO/OIE News release 06/32, Rome, 13 April 2006.

The national consultative committee on avian influenza (MoEF, WWF-India, Bombay Natural History Society, Wetlands International and FAO-India) in its meeting held on 8 September 2005 at New Delhi agreed to establish a "national surveillance and response group on avian influenza and wild birds" headed by Ministry of Environment and Forests with participants from government (including Ministry of Environment and Forests, Ministry of Agriculture, Ministry of Health and IVRI), NGOs (including Bombay Natural History Society, WWF-India and Wetlands International), international agencies (FAO and WHO) and others. It further resolved to prepare a comprehensive AI risk assessment, with maps based on sound information on the distribution of waterbirds, poultry, human concentrations and other factors.

The meeting decided to undertake detailed studies to map year-round distributions of waterbirds to identify areas of where birds stop on northward and southward migration and sites of concentration, identify precise migratory patterns of waterbirds and locations for first arrivals of

migratory waterbirds in South Asia. The need to monitor numbers of waterbirds at strategic locations across in each country, to determine patterns of usage of these areas at different times of the year and identify significant waterbird sickness and death events was also recognised as a priority.

India has over 243 species of waterbirds, 143 of which are migratory and come to the subcontinent from their breeding grounds in the northern latitudes of Russia, Central Asian countries, China, Mongolia westwards to the Persian Gulf. Detailed information on the distribution of waterbirds in India, their migration strategies and areas and timings of concentration are not well documented or easily accessible to government agencies, including environment, animal husbandry, public health workers, epidemiologists, and others who seek such vital information to support development of national AI risk assessments, action plans and contingency plans to deal with H5N1.

Further, the occurrence of highly pathogenic avian influenza (AI), H5N1 in poultry farms in February and March 2006 in Maharashtra, Gujarat and Madhya Pradesh in India has reinforced the need to improve our preparedness and to support the development of strategies to ensure that the virus does not spread in other parts of the country.

In the present Atlas an attempt has been made to prepare a geo-referenced site maps of the species richness and concentration in the Thar desert of the five species of waterbirds that were effected by the H5N1 outbreak in China in 2005. A total of 44 sites have been recorded listing effected H5N1 species (map 36). Further studies indicate that northern migratory waterbirds are recorded at 186 sites (map 37), while Anatid species are listed from 82 sites (map 35) and the heronry species spread over 82 sites (map 34). These maps could provide the base layer for GIS-based Information system on waterbird distribution and concentrations in India, which may be completed with additional information layers on habitats used by waterbirds, distribution of poultry farms and poultry-rearing activities. This programme may assist in management of future spread H5N1 virus in the country and the surveillance of the migratory waterbirds.

The extent of distribution and population density in the Thar Desert of the five species of waterbirds revealed that Great Cormorant was recorded at a maximum of 28 sites, followed by Bar-headed Goose (17 sites),

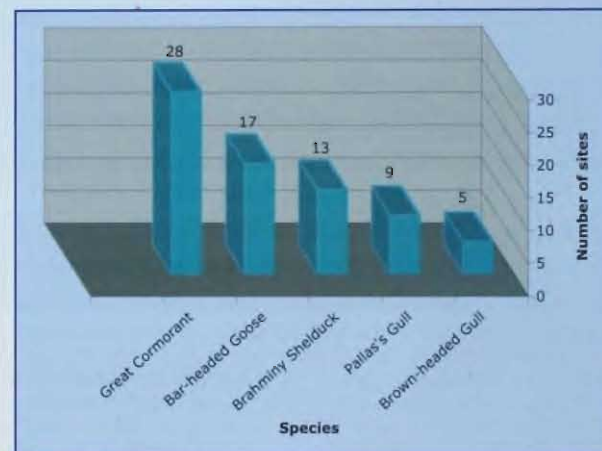


Chart 3. Frequency in Thar Desert of sightings of five species that are known to have been infected by H5N1 in China during 2005

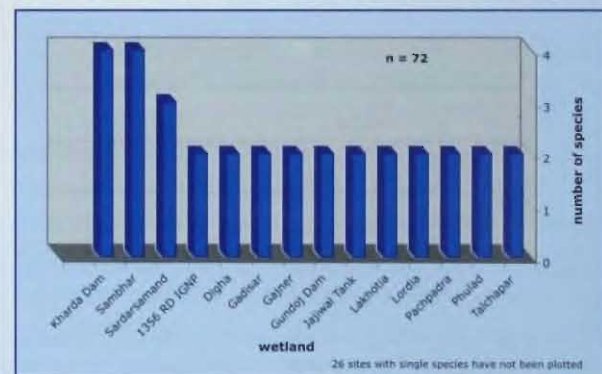


Chart 4. Frequency in Thar Desert of the five species of water birds that are known to have been infected by H5N1 in China during 2005



Map 28. Sites with Globally Threatened (Critical and Vulnerable) Species



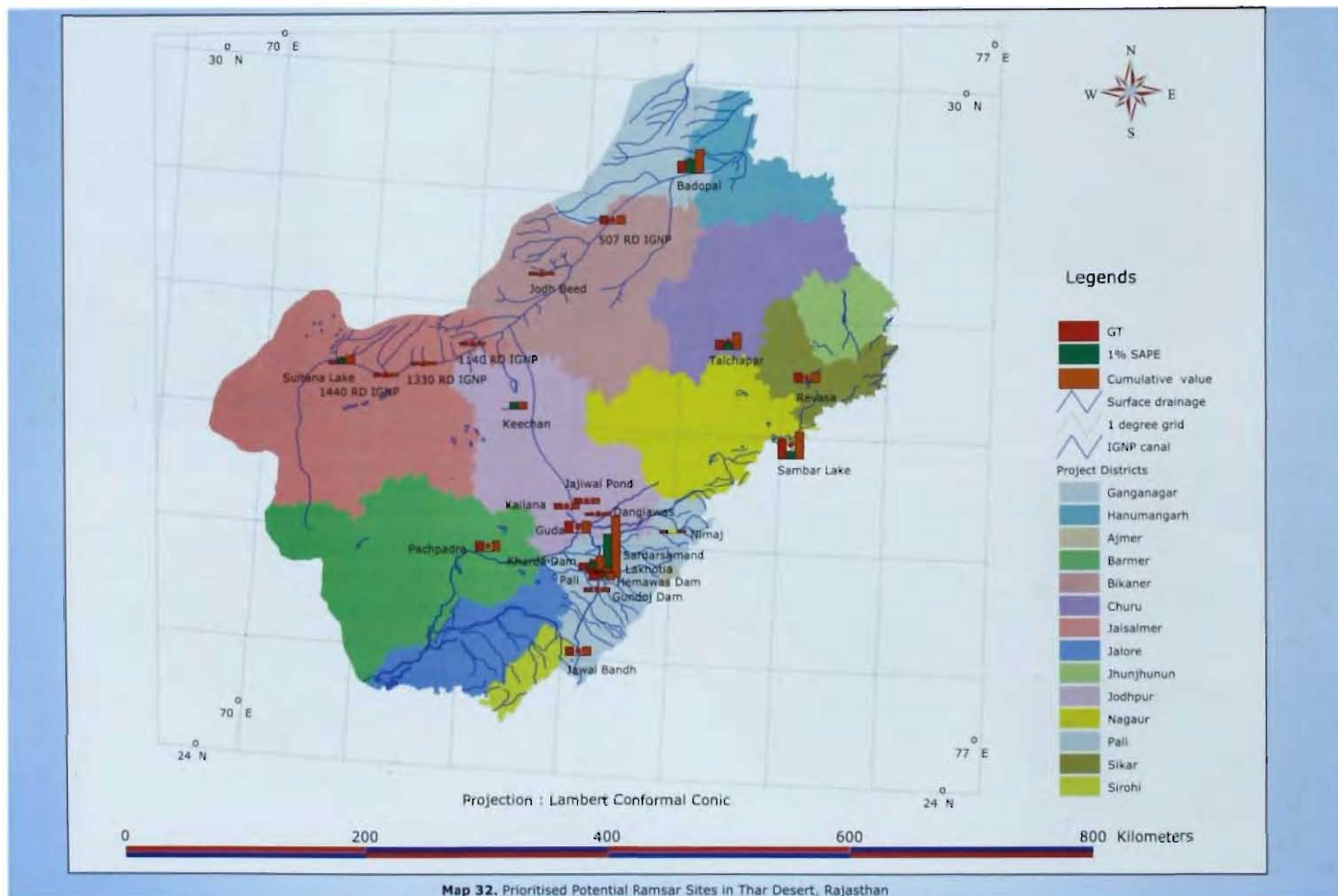
Map 29. Sites with species under CMS (Appendix I and II)

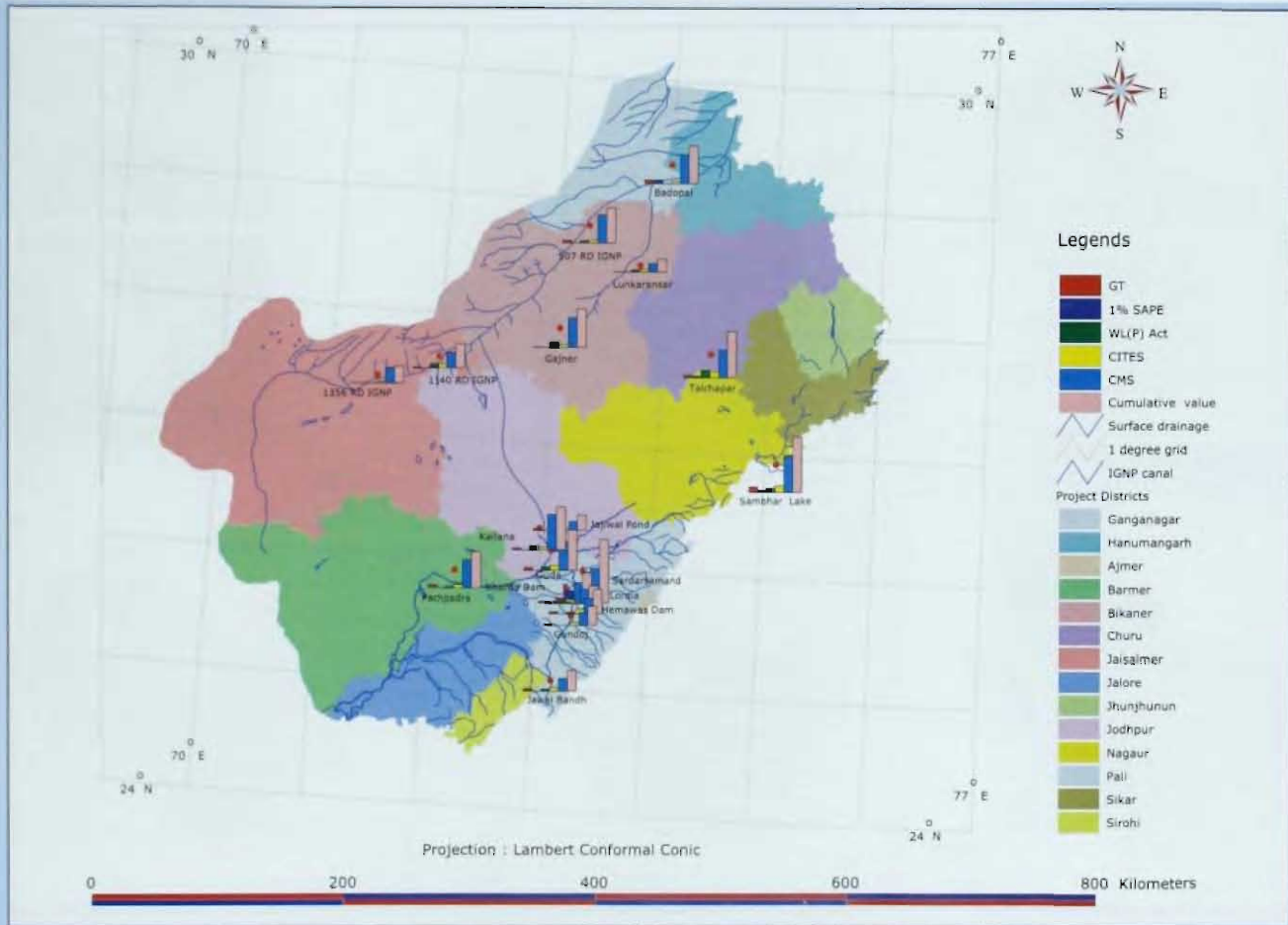


Map 30. Sites with species under schedule I of WL(P) Act, 1972



Map 31. Sites with species under Appendix I and II of CITES





Map 33. Prioritised wetlands in Thar Desert, Rajasthan



Map 34. Sites with Heronry Species



Map 35. Sites with Anatid species



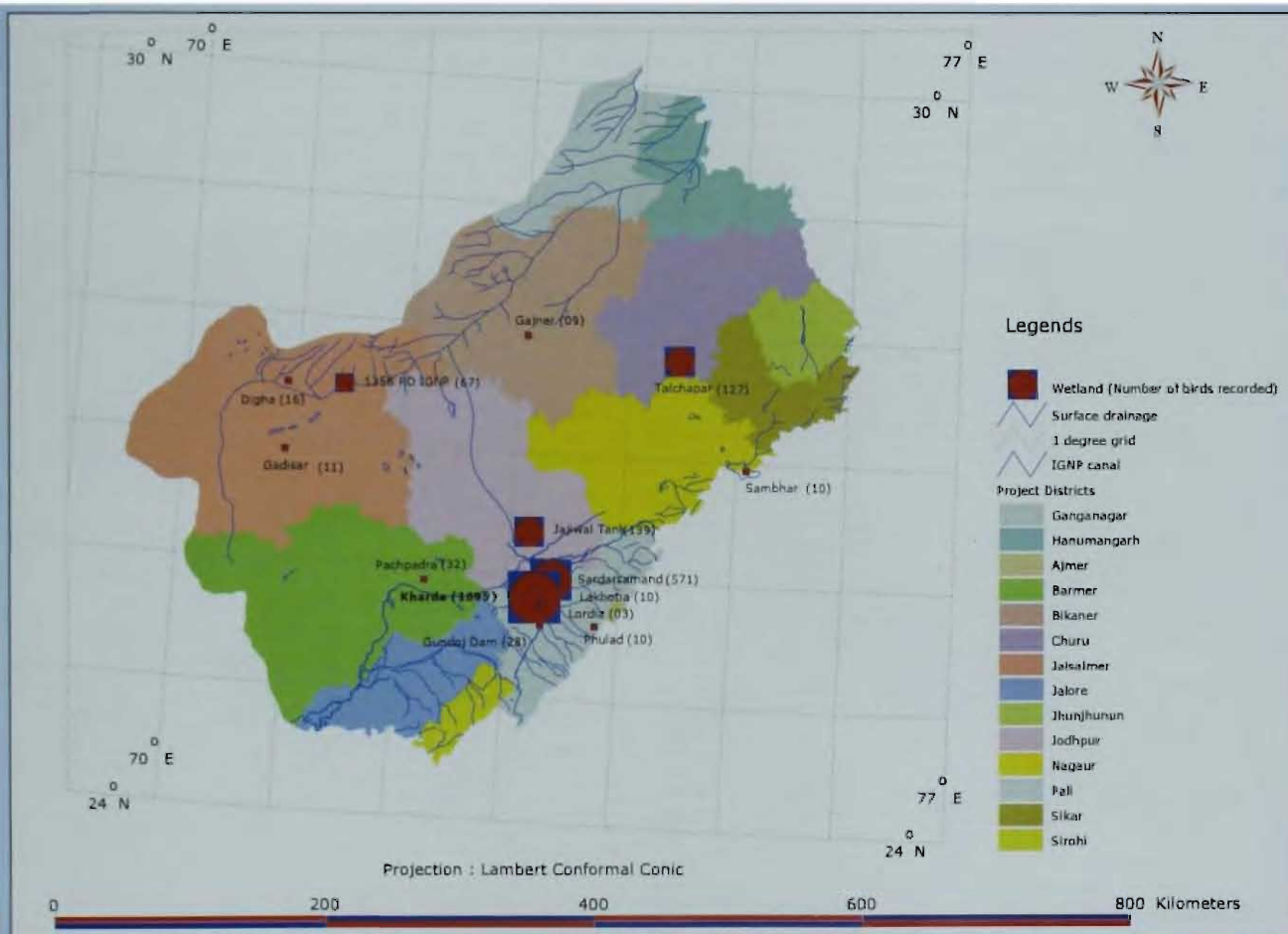
Map 36. Sites with five species that are Known to have been effected by H5N1 in China during 2005



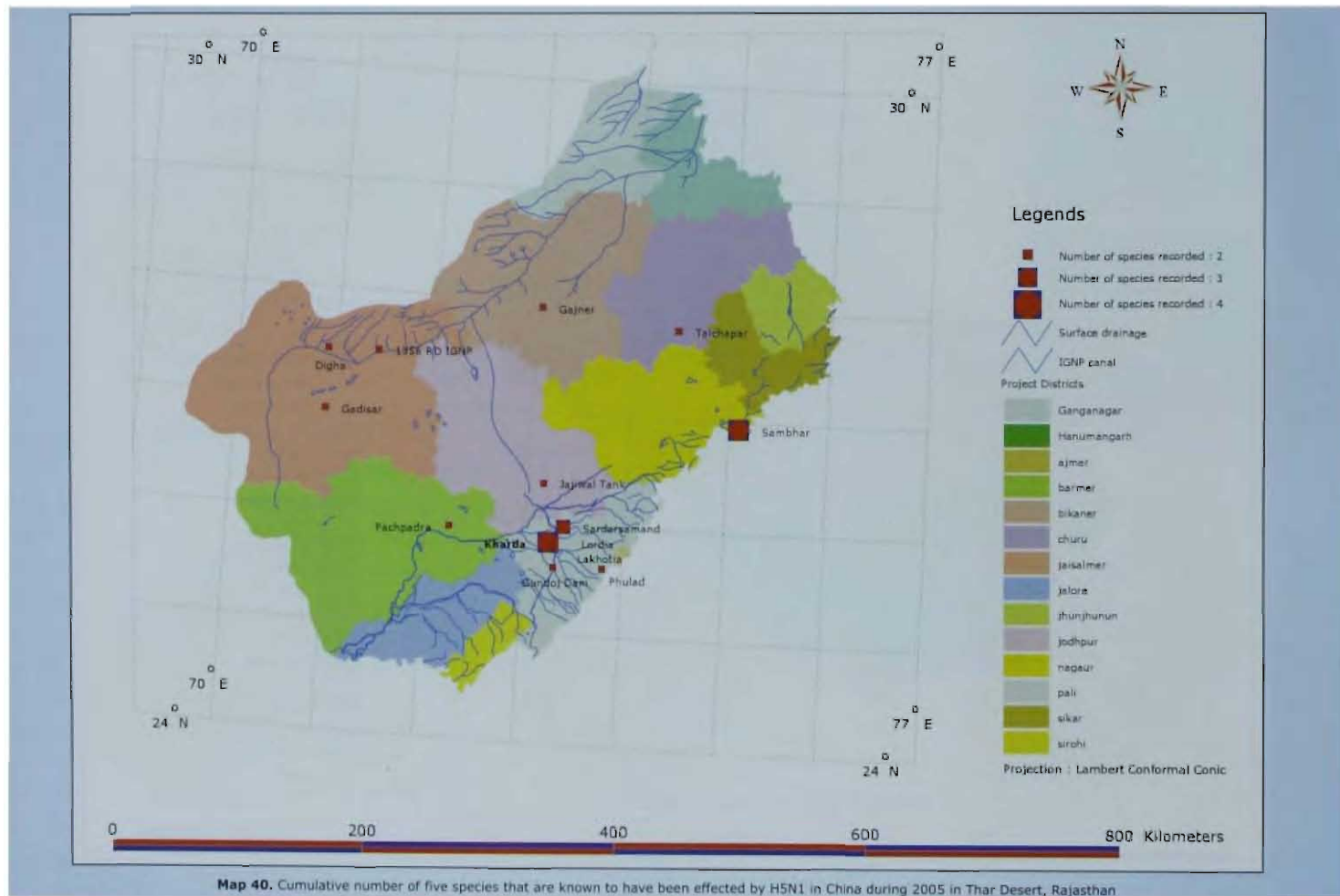
Map 37. Sites with winter migrant species



Map 38. Sites with 1% biogeographic populations



Map 39. Cumulative number of birds of five species that are known to have been effected by H5N1 in China during 2005 in Thar Desert, Rajasthan



Brahminy Shelduck (13 sites), Pallas's Gull (9 sites) and Brown-headed Gull (5 sites) (Chart 3). The maximum association of these species, i.e., 4 species are recorded from Kharda and Sambhar, 3 species from Sardarsamand while two from 11 more wetlands (Chart 4, map 39). The maximum cumulative number of birds (1695) of these five species is also recorded from Kharda (map 40). District Pali has the maximum concentration of these species on five wetlands (map 39).

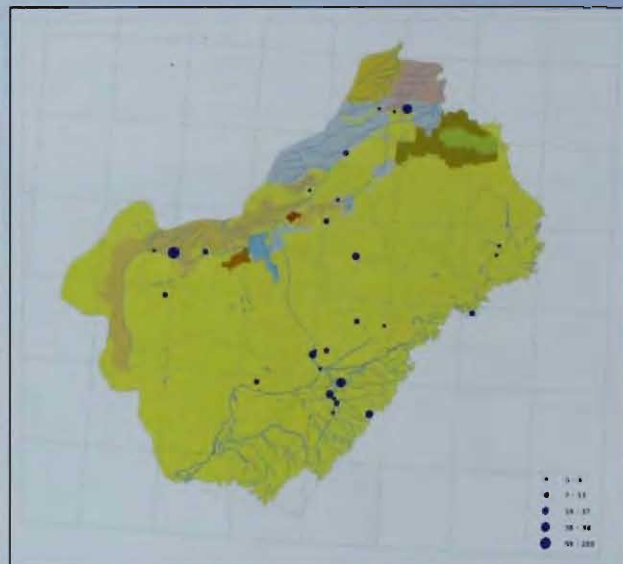
While the Atlas helps to identify the sites where the five species were recorded, it is very important to recognise that the presence of these species at these wetlands does not in any way reflect on a higher risk of the birds carrying the virus or of there potential to transmit the virus. This information provides the basis to prioritise sites for further monitoring and surveillance, based on the main species infected in the 2005 outbreak. Additionally, as explained above, the number of wild species being infected by the virus has increased over time and will continue to do so.



A flock of Garganey and Wigeon. Genan de Silva Wijeyeratne

1. *Tachybaptus ruficollis* (Pallas, 1764)

Little Grebe

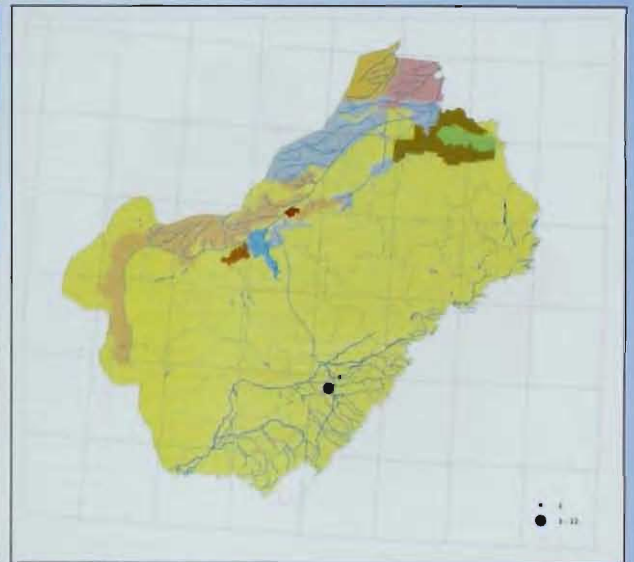
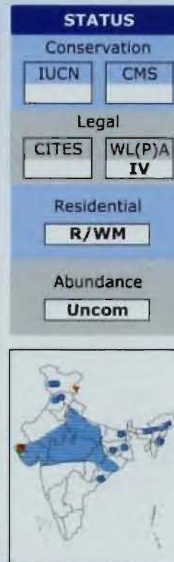
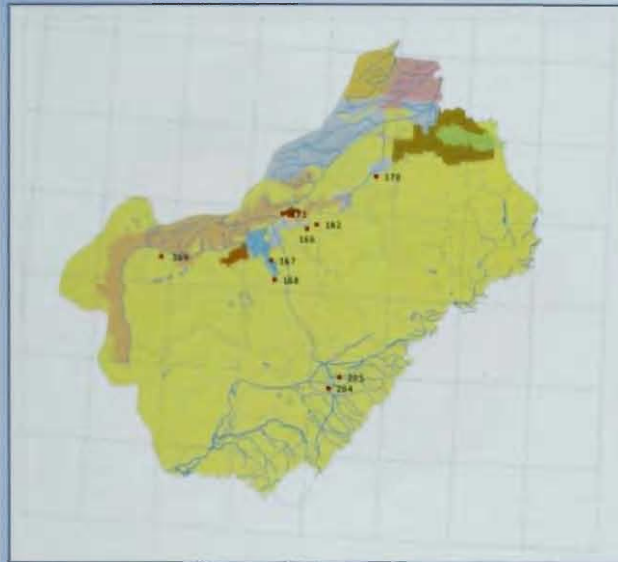


Diagnostics: tailless pigeon \pm ; 25-29 cm; C; *Adult:* Sexes alike. A small, squat and tailless bird with short pointed bill and backwardly placed legs. *Breeding* (summer): Forehead, crown and nape blackish-brown; lores, face, and chin chestnut; upper plumage lighter than the crown; flanks dusky brown and underparts silky smoky-white. *Non-breeding* (winter): Light brown with whitish chin, pale rufous neck and whitish under parts. **Habitat:** Stays in loose flocks in open waters during non-breeding season, but singly or in pairs in vegetation during breeding season. **Habits:** Keeps singly or in pairs, dives for safety when disturbed, breeds throughout the year, nest (like a pad of weeds) either floating or bedded on waterweeds. **Food:** Molluscs, fish, tadpoles, crustaceans and aquatic insects. **Status and Distribution:** Resident, widespread, locally common throughout India, except extreme NW, NE and Himalaya, from plains up to 1800 m (Kashmir); Pakistan; Nepal; Bhutan; Bangladesh; Sri Lanka. SW, S Asia. **Threshold number:** 10,000.

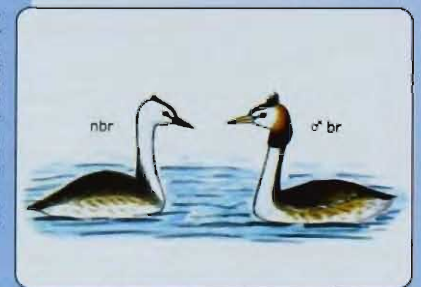


2. *Podiceps cristatus* (Linnaeus, 1758)

Great Crested Grebe

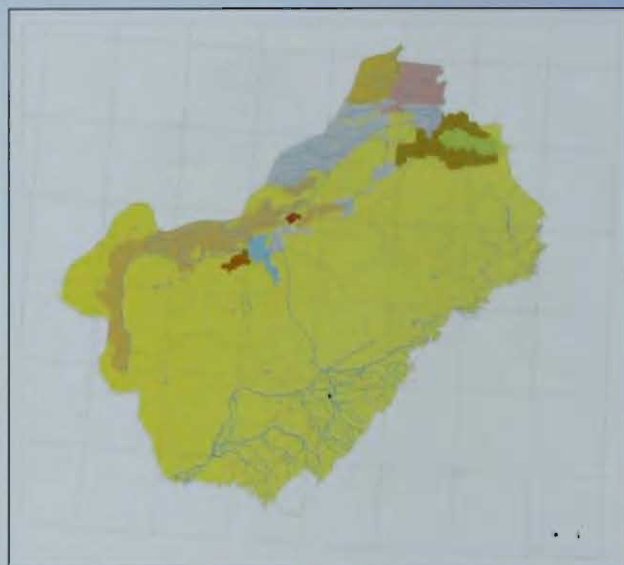
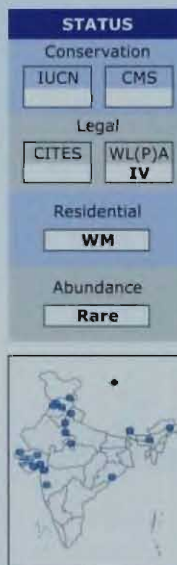
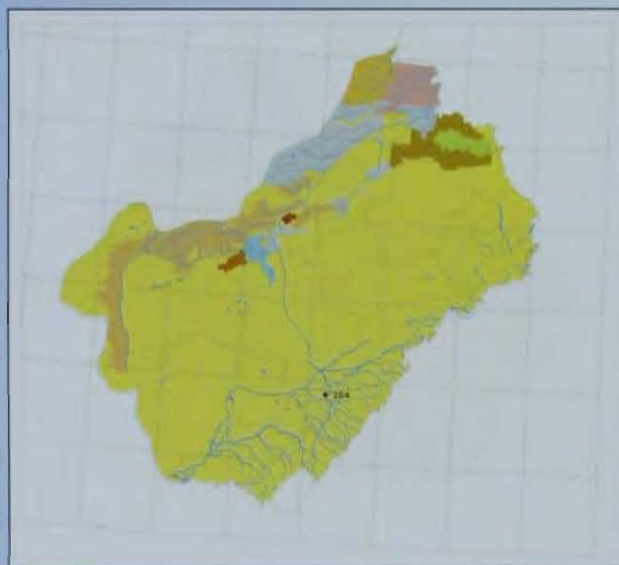


Diagnostics: domestic duck -; 46-51 cm; C/H; Sexes alike. **Adult:** characterised by slender white neck and straight pointed bill; two upstanding, backwardly directed ear tufts above head and a fringe of chestnut-and-black elongated feathers below the head. In winter (non-breeding), these 'ear tufts' much reduced, and in young birds absent. It has the black forehead, crown and crest; a blackish line from gape to eye; white lores and sides of the head, chin and throat; dark nape and back; mottled brown and rufous flanks and white underparts. **Voice:** Usually silent in winter. **Habitat:** Prefers open water lakes, reservoirs, jheels and salt pans. **Habits:** Swims with body low and erect neck, both male and female perform elaborate courtship display. Breeds in Ladakh between 4700 and 5200 m from June to August, also known to breed in Gujarat, winter migrant up to Vindhya. **Food:** Fish, frogs, tadpoles, aquatic insects, occasionally macrophytes. **Status and Distribution:** Occurs in small numbers in NW and C India from October to April, more common in coastal areas; Pakistan; Nepal; Bhutan; Bangladesh; breeds in C Asia, winters in S Asia. **Threshold number:** 250.



3. *Podiceps nigricollis* Brehm, 1831

Black-necked Grebe



Diagnostics: Dabchick +; 28-34 cm; C; Sexes alike. A small dark brown grebe with a slender pointed and slightly up tilted bill, white underparts and silvery white flanks. **Non-breeding:** In winter, distinguishable from very similar Little Grebe by blackish cap to below the eyes, mixed black and white chin and throat, and dark brown foreneck. **Breeding (summer):** Black head and neck, and a golden tuft, of feathers behind the eyes are the diagnostics. **Habitat:** Prefers shallow lakes or reservoirs with patches of emergent vegetation. **Habits:** Prefers reed-bordered wheels with floating vegetation and shallow water; occurs in company with Dabchicks, sometimes in large flocks. **Food:** Fish, tadpoles, frogs, shrimps and its own feathers. **Status and Distribution:** Uncommon winter migrant to N & NW India from plains to 3050 m; Nepal; Pakistan. Breeds in W & C Asia (also breeds in small numbers in W Pakistan hills); winters in SW, S Asia, Caspian Sea, Persian Gulf. **Threshold number:** 250.



4. *Pelecanus onocrotalus* Linnaeus, 1758

Great White Pelican

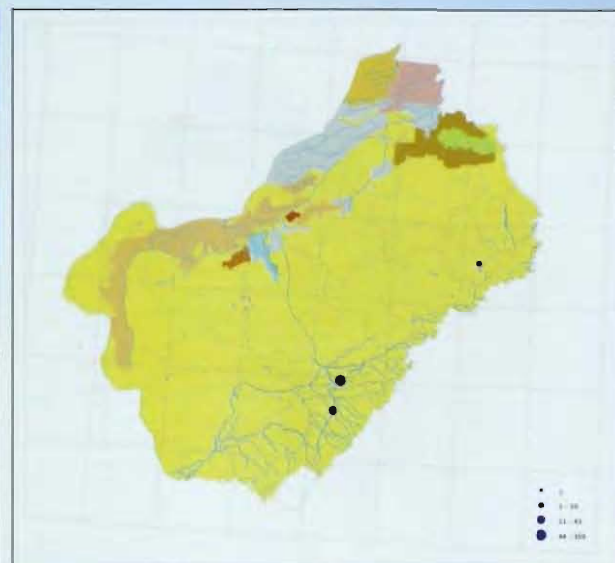
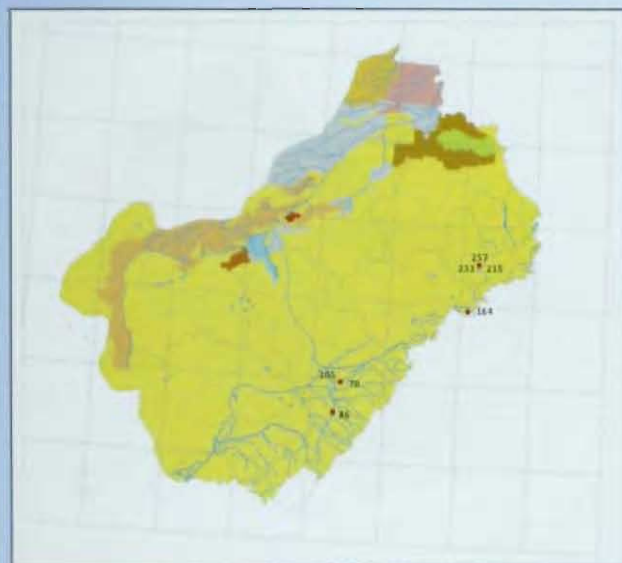


Photo: Bhimesh Bharti

Diagnostics: Vulture \pm ; 140-183 cm; C; **Adult:** Sexes alike, female smaller. Large white bird with yellowish pouch attached to the lower mandible. Bill lead-blue, mottled with white along the centre and with the nail and edges of both mandibles red; lower mandible is blue on the basal, yellow on the terminal half. Plumage mostly white tinged with rose; yellowish breast feathers, black primaries and underside of secondaries; feet fleshy-pink, with yellow webs. **Habitat:** Found in congregations in large Jheels, heronries, lagoons, salt pans and tidal creeks. **Habits:** May be found in small flocks as in N India or huge concentrations on large lakes as in the Great Rann of Kachchh; breeds from February to April; colonial nesting. **Food:** Chiefly fish. **Status and Distribution:** local winter migrant to NW, N and NE India. Common in Gujarat and Assam during winters; Pakistan; Nepal; Bangladesh; Maldives; Breeding in W & C Asia (also in Gujarat), winters 0 in S Asia. **Threshold number:** 230.



5. *Pelecanus philippensis* Gmelin, 1789

Spot-billed Pelican

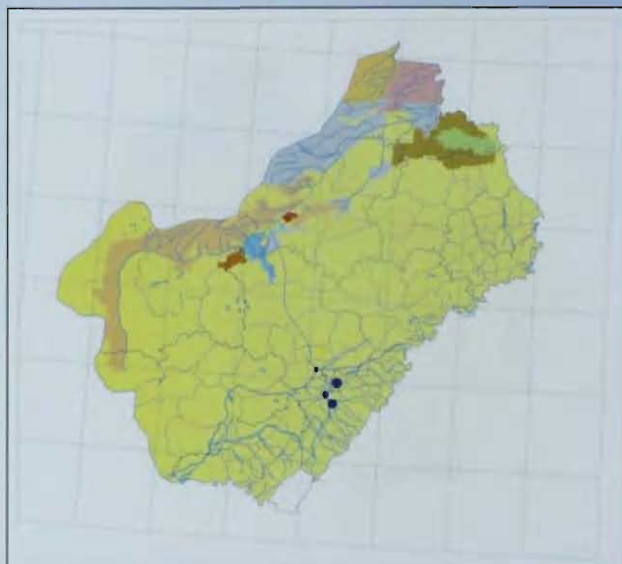
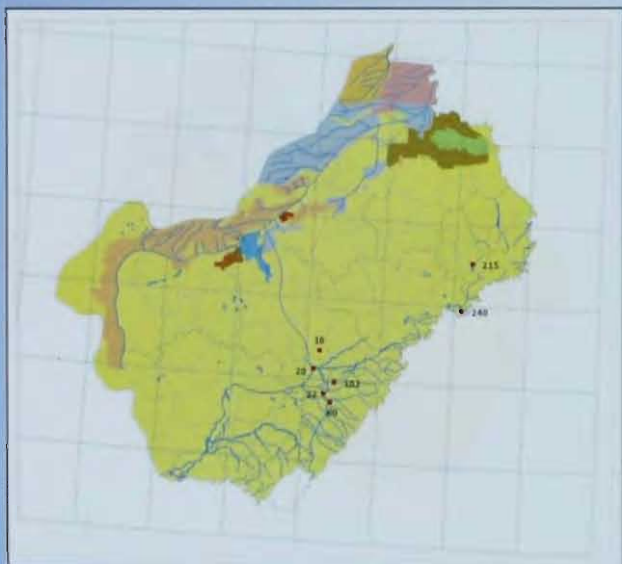


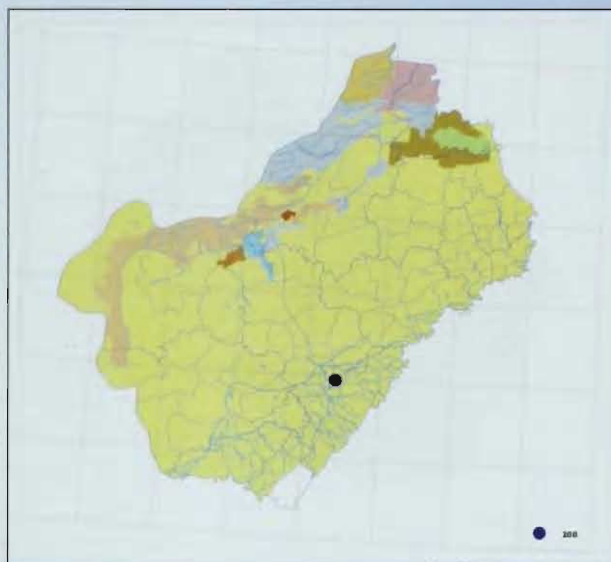
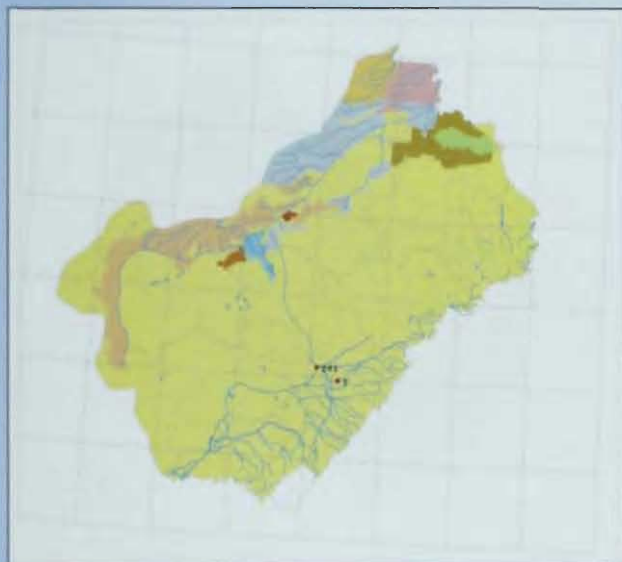
Photo: Rajendra Silva Wijeyeratne

Diagnostics: Vulture +; 140-152 cm; C; **Adult:** Sexes alike. Head, neck and upperparts grey; underparts greyish-white, under tail-coverts mottled with brown; bill and gular pouch flesh-coloured, blue spots on upper mandible and blackish marking on pouch; nuchal crest brown, composed of white-tipped elongated feathers; legs and feet dark brown. In summer, under wing-coverts and under tail-coverts slightly wine-coloured; in winter lower back, rump and flanks tinged with vinaceous. **Voice:** Usually silent. **Habitat:** Frequents a variety of deep or shallow wetlands, man-made and natural, freshwater and saline, including marshes, lakes, rivers, estuaries, reservoirs, flooded fields, brackish lagoons, tidal creeks and along coasts. **Habits:** Gregarious; often found in association with egrets and cormorants; breeds from September to April. **Food:** Mainly fishes in large quantity. **Status and Distribution:** Globally Threatened/Vulnerable. Locally common in breeding season in Assam, Karnataka, Andhra Pradesh and Tamil Nadu; Nepal; Bangladesh; Sri Lanka; Maldives. **Remarks:** The decline of this species is most strongly related to the disturbance or destruction of colonies. Presently a total of 11,500 individuals are estimated in the world, of which about 2,500-5,000 birds are known from the Indian subcontinent. **Threshold number:** 40.



6. *Pelecanus crispus* Bruch, 1832

Dalmatian Pelican

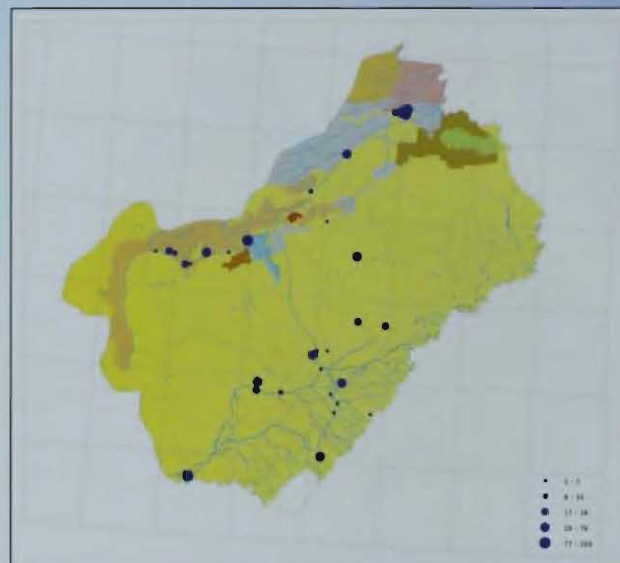


Diagnostics: Vulture +; 160-183 cm; C; Adult: Sexes alike, Plumage silvery-white, except black primaries and dusky secondaries; feathers on forehead end in a concave line instead of a point; a short curly tuft of feathers on back of head; bill grey with yellow nail; gular pouch pinkish-grey; legs and feet dark grey. **Voice:** Usually silent. **Habitat:** Flocks in large lakes, marshes, rivers, lagoons and salt pans. **Habits:** Occurs singly or in pairs or in small flocks. **Food:** Almost exclusively fish. **Status and Distribution:** WM in small numbers; the main influx arrives from the west, while very small numbers are recorded in Assam; common during winters in Gujarat and Rajasthan; Pakistan; Bangladesh. Breeds in SW & C Asia, winters in SW, S Asia. **Remarks:** There has been a drastic decline in the number of birds since the 19th century due to large-scale persecution by fishermen and contamination of food due to poisonous pesticides. The global population of this species has stabilised at 15,000-20,000 individuals (including 4,000-5,000 breeding pairs). **Threats:** Wetland drainage, shooting and persecution by fishermen primarily caused past declines in the global population of this species. **Protected areas and habitat management:** Birds regularly visit Keoladeo National Park, Khijadia lakes, Gujarat, have been declared a bird sanctuary in which all hunting is prohibited. **Threshold number:** 110.



7. *Phalacrocorax niger* (Vieillot, 1817)

Little Cormorant

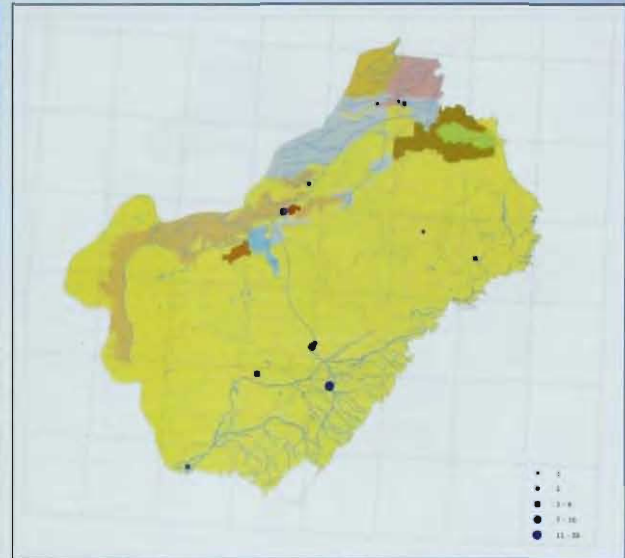


Diagnostics: Jungle Crow +; 51 cm; C; **Adult:** Sexes alike. Has smaller and black body with stout and hooked bill, blackish at tip and bluish purple at base; domed forehead; stiff tail; and without yellow gular skin. **Breeding:** Black with glistening blue-green; upper back and wing-coverts dark silvery grey; short occipital crest, a few white silky feathers on forecrown, sides of head and neck. **Non-breeding:** Crest and white feathers disappear, and feathers at base of lower bill appear white, sometimes extending to throat. **Voice:** Usually silent. **Habitat:** Found in lakes, rivers, irrigation reservoirs, canals, prefers village tanks; estuaries, etc. **Habits:** Often found in large flocks in lakes and reservoirs; also occurring singly or in small groups in rivers, etc.; hunts on fish in groups; breeds in mixed colonies from July to September. **Food:** Largely fish, also on tadpoles, frogs and crustaceans. **Status and Distribution:** A resident species, widespread and common in plains of India; Pakistan; Nepal; Bhutan; Bangladesh; Sri Lanka; SE Asia. **Threshold number:** 1500.



8. *Phalacrocorax fuscicollis* Stephens, 1826

Indian Shag

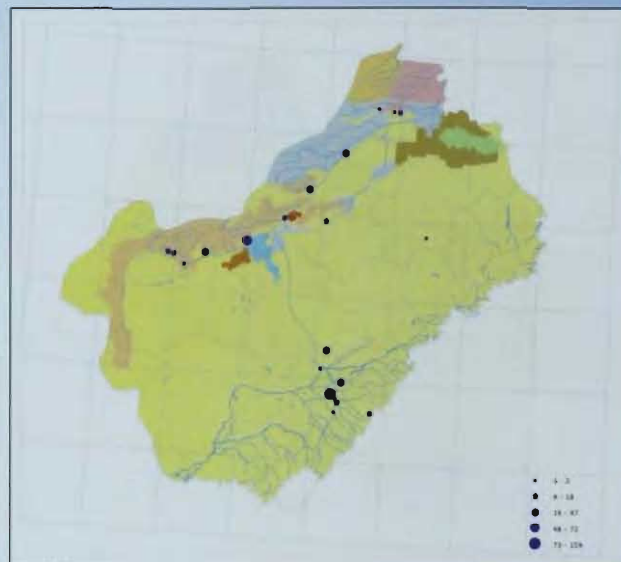


Diagnostics: Duck +; 63 cm; C; *Adult:* Sexes alike. Chiefly a black water bird with blue-green eyes; dark brown bill; yellow gular skin; white speckled throat; black legs and feet; scaly effect on back and wings visible on a closer look. *Breeding* (July-February): Upper plumage iridescent bronze-black; under plumage glossy black; a white tuft of feathers on each side of the neck behind eyes, a few specks on head; face black-purplish. *Non-breeding:* Plumage without gloss. *Juvenile:* Scaly bronze-brown above with black primaries and tail; white below; flanks mottled with brown and white. **Voice:** Usually silent. **Habitat:** Freshwater lakes, jheels, reservoirs, rivers, estuaries, and mangroves. **Habits:** Found in large flocks, more gregarious than Large Cormorant; sometimes feeds with Little Cormorant. Locally common; undertake local movements depending on water conditions; breeds gregariously from August to October, generally July to February. **Food:** Chiefly fish. **Status and Distribution:** A resident species occurring almost throughout India, except extreme NW, NE and Himalaya; Pakistan; Bhutan; Bangladesh; Sri Lanka; Myanmar. SE Asia. **Threshold number:** 300.



9. *Phalacrocorax carbo* (Linnaeus, 1758)

Great Cormorant

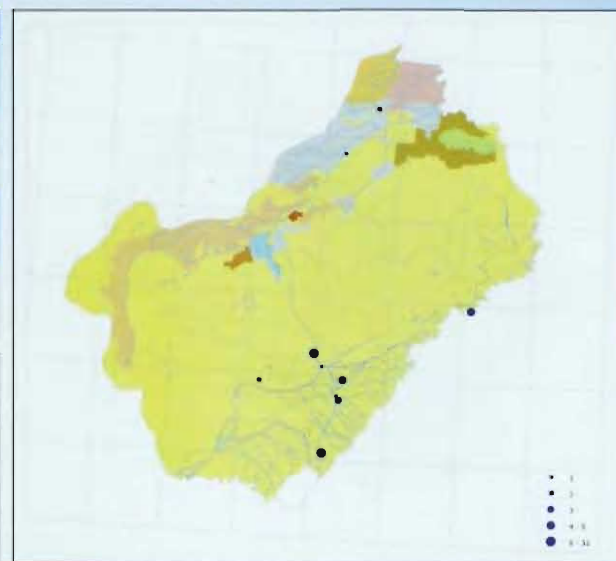


Diagnostics: large duck; 80-100 cm; C; *Adult:* Sexes alike. Black waterbird with a slender bill, hooked at tip and stiff longish tail. *Breeding:* Glossy black plumage with metallic blue-green sheen; throat and front half of face white; gular pouch bright yellow; silky white plumage on head and neck; a broad white patch on posterior flanks. *Non-breeding* (winter): Yellow gular pouch less bright; silky white of head and neck along with the white patch of posterior flanks disappear. *Juvenile:* Brown above and white below. **Voice:** Usually silent. **Habitat:** Reservoirs, lakes, (high altitude lakes in Himalaya up to 3500 m) and large rivers: coastal wetlands. **Food:** Carnivorous, voracious fish feeder. **Habits:** Occurs in small groups generally in the deeper waters for fishing, forms large flocks during breeding season, breed in large heronries from September to February. **Status and Distribution:** Locally common resident almost throughout India, part population of winter migrants in NW India; Pakistan; Nepal; Bhutan; Bangladesh; Sri Lanka. Breeds in C & S Asia, winters in S Asia. **Threshold number:** 1,000.



10. *Anhinga melanogaster* Pennant, 1769

Darter



Diagnostics: Duck +; 85-97 cm; C; **Adult:** Sexes alike. Like cormorant but with long slender snake-like neck; narrow head; pointed and small dagger-shaped bill and fan-shaped stiff tail. A white streak from eye to sides of the neck; white chin and throat, remaining head and neck velvety chocolate-brown; black above; back and wings longitudinally streaked and speckled with silver-grey; entirely black below, including legs. **Voice:** Usually silent. **Habitat:** Lakes, jheels, reservoirs, rivers, ponds, marshes and mangroves, also coastal waters. **Habits:** Occurs singly, in twos or small flocks, only rarely in large flocks; swims with submersed body with only snake-like head and neck protruding, which the bird turns from side to side; breeds gregariously in heronries from July to December. **Food:** Chiefly on fish, occasionally swallows too large ones. **Status and Distribution:** It is a resident species almost throughout India, locally common in Assam, uncommon elsewhere, Pakistan; Nepal; Bangladesh; Sri Lanka. **Remarks:** The species is generally uncommon and declining throughout Asia, although an estimate of 4,000 for South Asia may be too low. It inhabits shallow inland wetlands including lakes, rivers, swamps and reservoirs, as well as estuaries, tidal inlets, mangroves and coastal lagoons, ascending to 1,400 m, at least in India and Java. It is primarily threatened by habitat loss, disturbance (at feeding grounds and colonies), hunting and pollution (BirdLife Int., 2001). **Threshold number:** 40.



11. *Egretta garzetta* (Linnaeus, 1766)

Little Egret

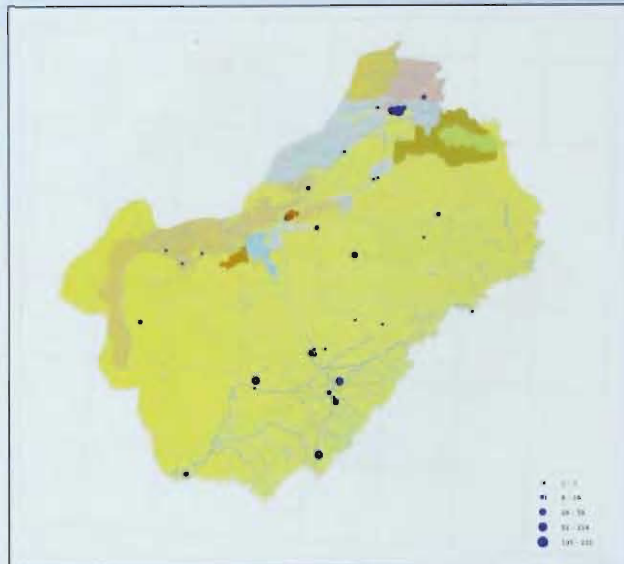
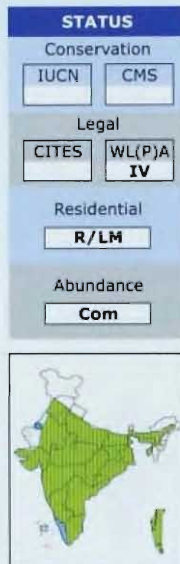


Photo: Gehan de Silva Wijeyeratne

Diagnostics: domestic hen \pm ; 55-63 cm; C; *Adult:* Sexes alike. A pure white bird like the other egrets, but smaller with black bill and legs, and yellow feet. **Breeding** (July-September): A drooping nuchal crest of two long narrow plumes; filamentous ornamental feathers on breast and scapulars; a thick bunch of decomposed dorsal plumes extends beyond the tail. **Non-breeding:** The ornamental plumes are dropped though occasionally some of the scapular plumes are retained. **Voice:** Usually silent. **Habitat:** Marshes, jheels, lakes, rivers, paddy fields, mudflats, etc. **Habits:** Generally found in flocks, more gregarious than the two large species, roosts communally on trees, breeds in colonies, often in mixed heronries from July to September. **Food:** Fish, frogs, crustaceans and aquatic insects. **Status and Distribution:** Throughout India up to 900 m, except NW and NE; Pakistan; Nepal; Bhutan; Bangladesh; Sri Lanka; Maldives. **Threshold number:** 600.



12. *Ardea cinerea* Linnaeus, 1758

Grey Heron

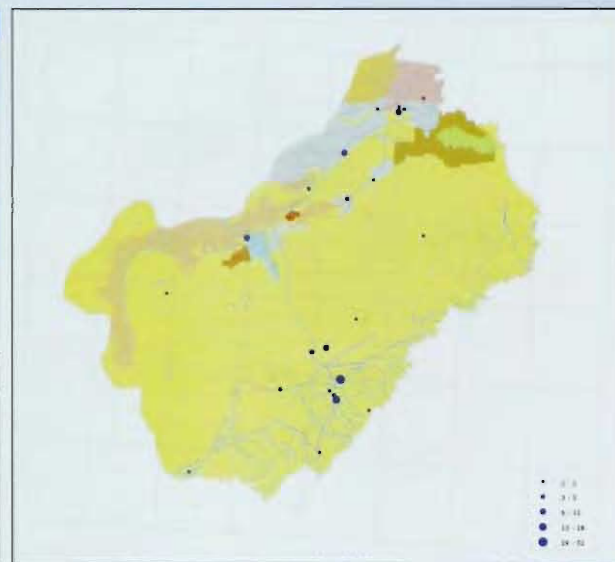
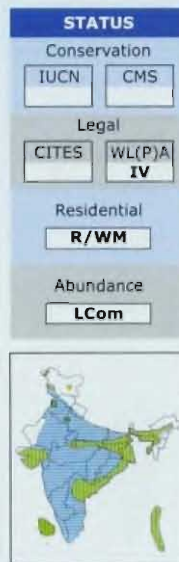


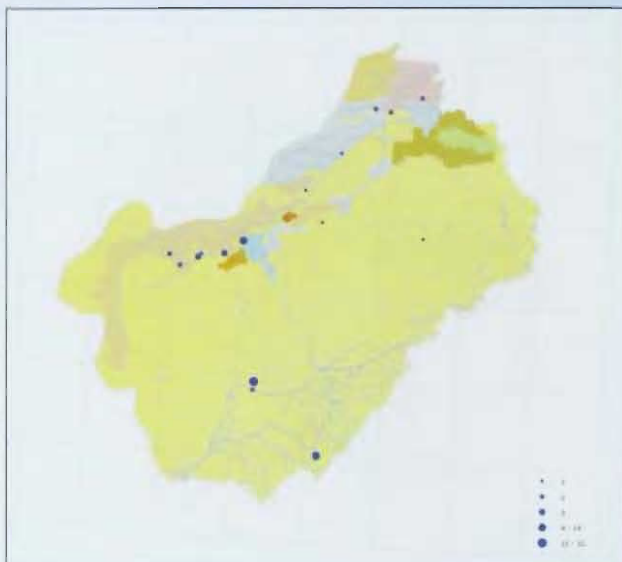
Photo: Swain Beckum

Diagnostics: 90-98 cm; C; *Adult:* Sexes alike, but female smaller with less developed occipital crest and pectoral plumes. A long-legged and long-necked ashy-grey bird with yellow bill; long black occipital crest; white crown and neck; black dotted line down middle of foreneck; elongated black-streaked white feathers on breast; underparts greyish-white; ashy-grey above; darker central feathers with black tips; primaries, outer secondaries, primary coverts and bastard wing almost black; tail grey. *Juvenile:* Brownier and darker grey with foreneck more conspicuously black-streaked and without lengthened scapulars and breast plumes. **Voice:** Loud *frank* while in flight. **Habitat:** Affect jheels, marshes, rivers, lakes, estuaries, mangroves, coral reefs and offshore islands. **habits:** Diurnal, generally solitary, though roosts communally in winter, breeds in colonies almost throughout the year; generally nests among reeds. **Food:** Fish, frog, aquatic invertebrates such as insects, crustaceans and mollusks; known to cause considerable damage to hill trout in Himalaya. **Status and Distribution:** Widespread resident in India, winter migrant in small pockets; locally common; breeds throughout the year, up to 1750 m in Kashmir from March to June; recorded up to 4500 in Ladakh; Pakistan; Nepal; Bangladesh; Bhutan; Sri Lanka; Maldives. **Threshold number:** 200.



13. *Ardea purpurea* Linnaeus, 1766

Purple Heron

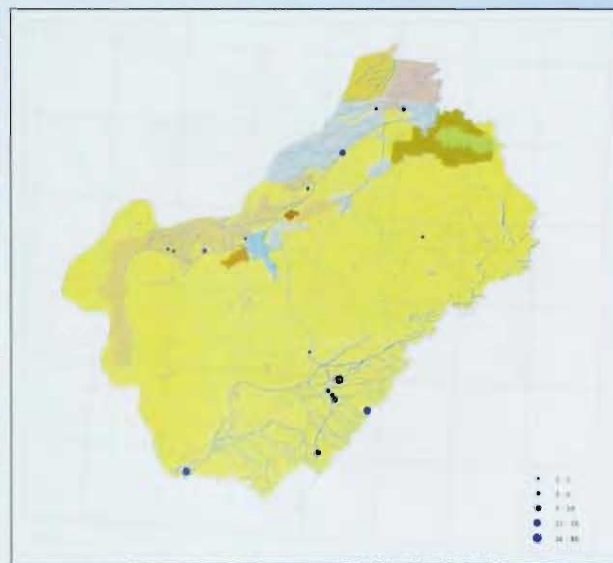


Diagnostics: Grey Heron -; 78-90 cm; C; **Adult:** Sexes alike, female with less developed crest and pectoral plumes; a lanky marsh bird with long slender snake-like neck; slaty-purple above; chestnut and black below. Bill dark yellow; drooping crest black; crown, crest and a line down hind neck black; a second up-running black line from gape to crest; a third black line down whole length of side of neck; rest of head and neck rufous with another black streak down fore-neck. Chin and throat white; long drooping plumes on upper breast buff white with black and chestnut streaks; rest of upperparts slaty black and rich chestnut; underparts chiefly chestnut and black; legs reddish-brown. **Juvenile:** Cinnamon-brown. **Voice:** Loud *frank* while in flight. **Habitat:** Marshes with elephant grass, lakes, jheels, rivers and paddy fields. **Habits:** Generally solitary, shy, feeds in dense aquatic vegetation, active in morning and evening. Breeds almost round the year. **Food:** Chiefly fish, frog, also water insects. **Status and Distribution:** A resident and locally common species throughout the plains of India; Pakistan; Nepal; Bhutan; Bangladesh; Sri Lanka; Maldives. **Threshold number:** 250.



14. *Casmerodius albus* (Linnaeus, 1758)

Large Egret

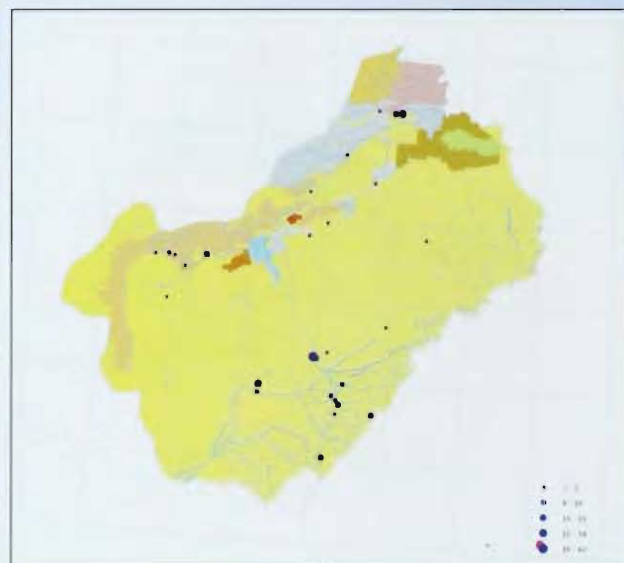


Diagnostics: Grey Heron \pm ; c 91-96 cm; C; **Adult:** Sexes alike; a snow-white bird with yellow beak and black legs. Breeding birds with black beak; edge of gape, naked lores and orbital skin behind eyes bright green; three sets of long, transparent, white plumes growing from scapulars extending beyond tail. **Juvenile:** Pure white. **Voice:** Usually silent, occasionally utters low *kraak*. **Habitat:** Jheels, marshes, rivers, lakes, estuaries, mangroves and coral reefs. **Habits:** Diurnal, unsocial, generally solitary though roosts and feeds communally, breeds in mixed heronries of storks, darters and cormorants, etc. Generally breeds from May to November. **Food:** Fish, frogs, aquatic insects and crustaceans. **Status and Distribution:** Resident throughout India shifts locally depending on availability of water, Sri Lanka; Nepal; Maldives; Caspian, C & SW Asia. **Threshold number:** 1000.



15. *Mesophoyx intermedia* (Wagler, 1829)

Median Egret

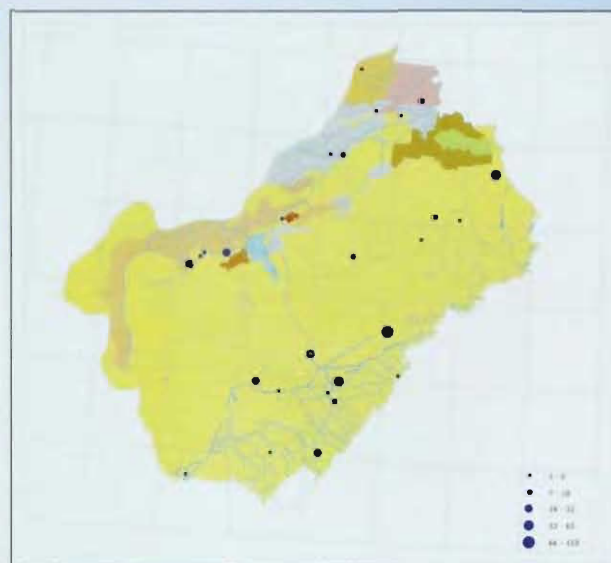


Diagnostics: 65-72 cm; C; *Adult:* Sexes alike; comparatively medium-size snow-white egret. *Non-breeding:* Often indistinguishable. *Breeding:* Develops filamentous plumes on breast as well as back, and the yellow bill (non-breeding) turns black. **Voice:** Normally silent, makes buzzing calls during display. **Habitat:** Lakes, reservoirs, marshes, pools with vegetation, jheels, inundations, estuaries, mangroves and tidal creeks. **Habits:** Diurnal, occurs in small flocks, roosts and feeds communally, often solitary when hunting, breeds in colonies in mixed heronries from May to November. **Food:** Fish, frogs and aquatic insects. **Status and Distribution:** Throughout India; Pakistan; Nepal; Bhutan; Bangladesh; Sri Lanka; Maldives. **Threshold number:** 250.

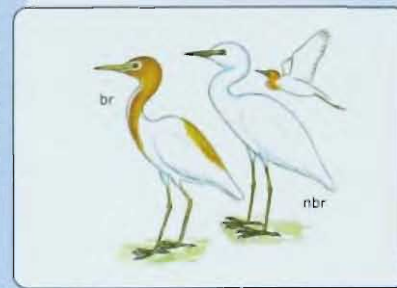


16. *Bubulcus ibis* (Linnaeus, 1758)

Cattle Egret

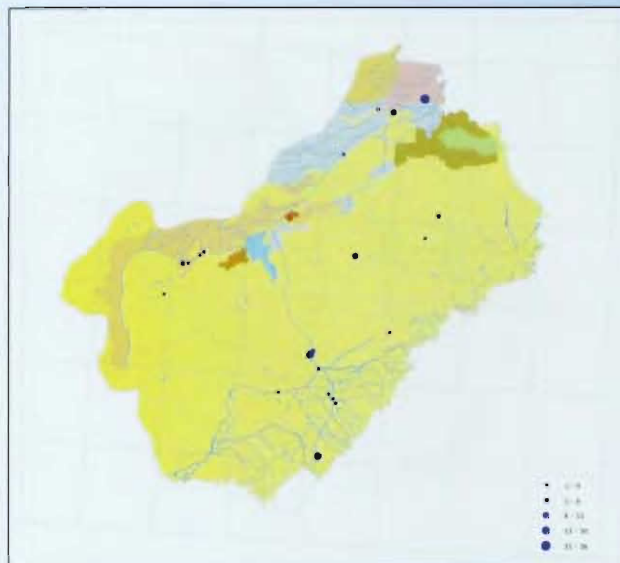


Diagnostics: Hen \approx 48-53 cm; C; **Adult:** Sexes alike; lanky snow-white bird. **Non-breeding:** Like Little Egret, but always identified by yellow bill contra black. **Breeding:** Golden-buff plumes on head, neck and back. **Voice:** Generally silent. **Habitat:** Damp grassland, fallow, paddy fields, and periphery of canals, lakes, and reservoirs. **Habits:** Gregarious when feeding and roosting, invariably accompanying grazing village livestock, feeds on insects disturbed by animals. Breeds almost round the year, though mainly from June to August in N India, breeds in mixed colonies on large trees, often away from water. **Food:** Chiefly insects such as beetles and grasshoppers, besides earthworms. **Status and Distribution:** A common resident species throughout India, up to 1500 m in Himalaya; Pakistan; Nepal; Bhutan; Bangladesh; Sri Lanka; Maldives.

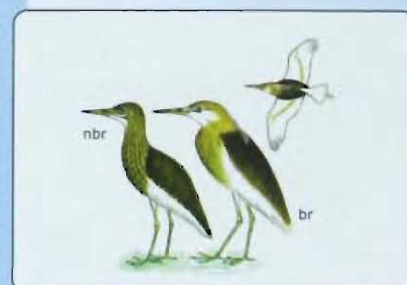


17. *Ardeola grayii* (Sykes, 1832)

Indian Pond-Heron

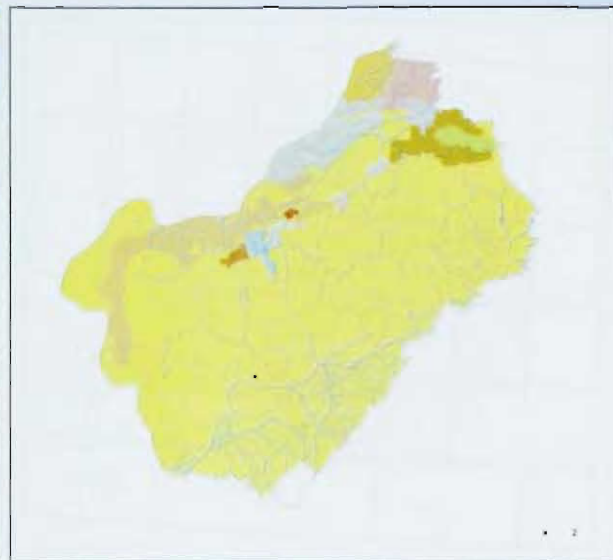


Diagnostics: Hen +; 42-45 cm; C; **Adult:** Sexes alike. A thickset, earthy-brown at rest and largely snow-white in flight waterbird has yellow bill, which is black at tip and bluish at base; white chin, throat and foreneck; horny-green legs. **Breeding:** Long recumbent white or buff occipital crest of lanceolate plumes; ashy-brown upper breast; deep maroon and long decomposed feathers on back; white underparts. **Non-breeding:** Dark brown head and neck with buff streaks of sides of neck prominent; brown mantle; white streaks on scapulars; white underparts. **Voice:** Harsh croak when flushed, at nest utter human-like wa-koo. **Habitat:** Streams, jheels, marshes, ponds, rice fields, village tanks, ditches, wells and mudflats. **Habits:** Generally solitary or in small groups when hunting, gregarious when roosting, nests in colonies; collects in large numbers in drying ponds to feast on frogs and fishes, breeds almost throughout the year. **Food:** Voracious feeder on frogs and fish, besides aquatic insects. **Status and Distribution:** A common and wide spread resident species, undertakes local movements; throughout India up to 1500 m in Himalaya, Pakistan; Nepal; Bhutan; Bangladesh; Sri Lanka; Myanmar; Maldives; SW Asia. **Threshold number:** 10,000.



18. *Butorides striatus* (Linnaeus, 1758)

Little Green Heron



Diagnostics: Pond Heron =; 40-48 cm; C; *Adult:* Sexes alike; chiefly a black, grey and dark metallic green heron with black bill; glossy greenish-black forehead, crown and longish occipital crest; white chin, cheeks and central throat; grey head and neck. Upper parts slaty-grey glossed with bronze-green; lower parts ashy-grey and under tail-coverts white with blackish edges; legs dull green or plumbeous green. *Juvenile:* Brownish above, white below; dark streaks at sides; wings with white spots. **Voice:** Usually silent, when flushed utters alarm note k'yow or k'yek. **Habitat:** Rivers, lakes, marshes with dense vegetation on the banks, also backwater, mangrove and tidal creeks. **Habits:** Solitary, frequents the same area, crepuscular, usually remains in thick vegetation, occasionally active during day, often perches on overhanging branches. Apparently breeds twice in a year from March to September. **Food:** Chiefly fish, frogs, crustaceans (crabs) and aquatic insects. **Status and Distribution:** Resident, widely spread almost throughout Indian plains, except NW portions; Pakistan; Nepal; Bhutan; Bangladesh; Sri Lanka; Maldives; SE Asia. **Threshold number:** 1250.



19. *Nycticorax nycticorax* (Linnaeus, 1758)

Black-crowned Night-Heron

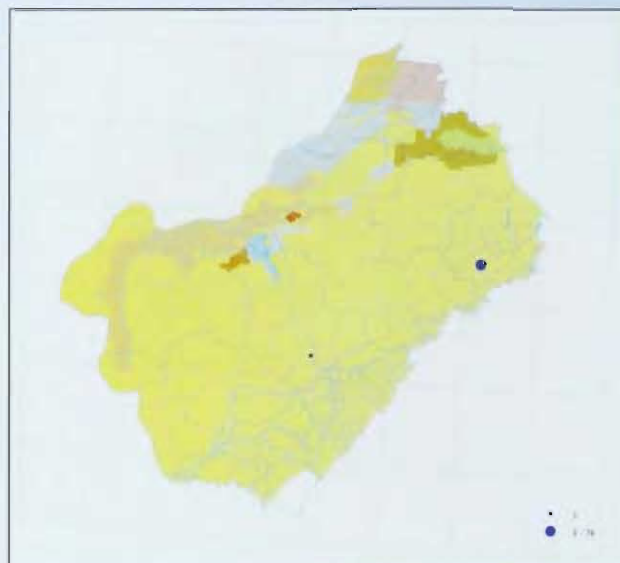
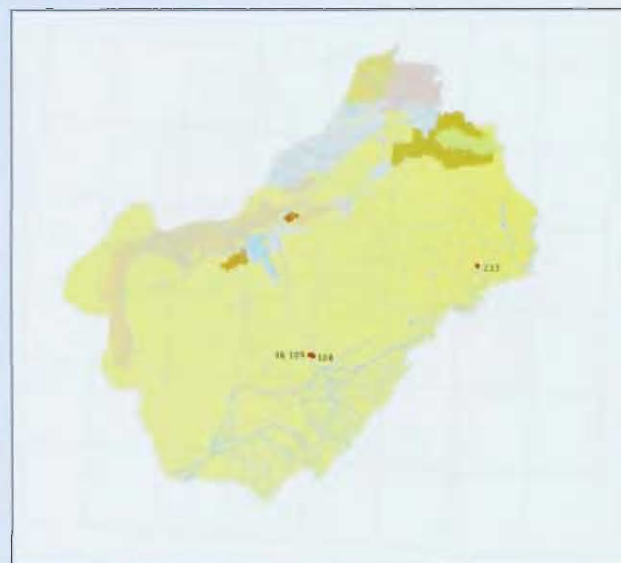


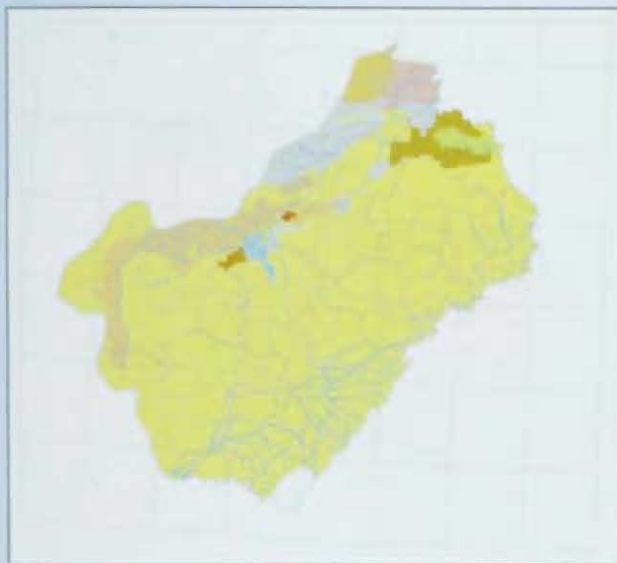
Photo: Gagan de Silva Wijeyeratne

Diagnostics: Pond Heron =; 58-65 cm; C; **Adult:** Sexes alike; strongly built grey, white and black heron with stout black bill. Crown, nape and occipital crest black with two or three very long, narrow white plumes; forehead and a streak over eye white; sides of neck, wings, rump and tail greyish; eyes blood-red; underparts white; legs and feet pale-green, in breeding season turn pinkish and bill blacker. **Juvenile:** Pale-smoky brown with bright yellow eyes and resembles adult pond heron except for white wings. **Voice:** Usually silent, *weck* or *kwock* in flight. **Habitat:** Reservoirs, jheels, tanks, streams, ponds, rivers, mangroves, estuaries, creeks and lagoons. **Habits:** Nocturnal or crepuscular except in breeding season. Generally gregarious, during daytime roosts on dense trees, often at dusk, breeds in pure colonies from December to September, April to May in Kashmir and June-July to September in N India. **Food:** Chiefly fish, frog, aquatic insects such as Odonata larvae. **Status and Distribution:** Resident, nomadic, patchily distributed throughout India up to 1700 m, Andaman and Nicobar islands; Pakistan; Nepal; Bhutan; Bangladesh; Sri Lanka; Maldives. **Threshold number:** 1000.



20. *Ixobrychus minutus* (Linnaeus, 1766)

Little Bittern



STATUS

Conservation

IUCN

CMS

Legal

CITES

WL(P)A

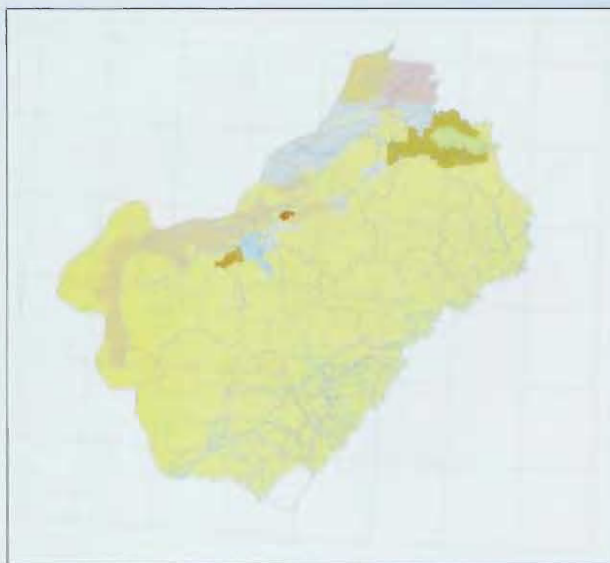
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Residential

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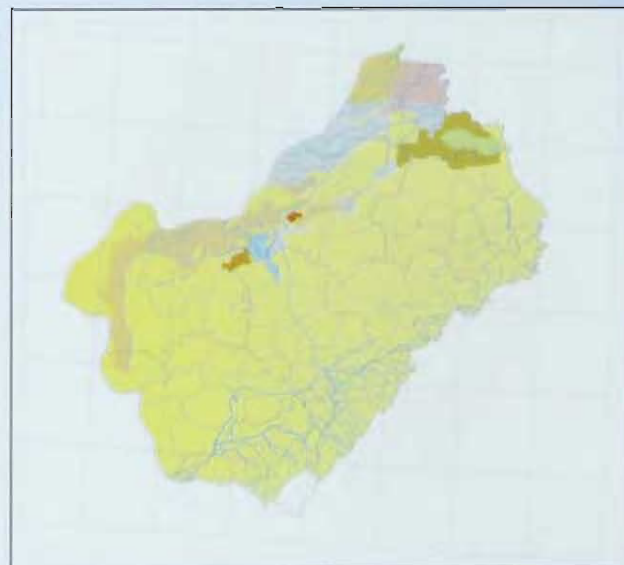
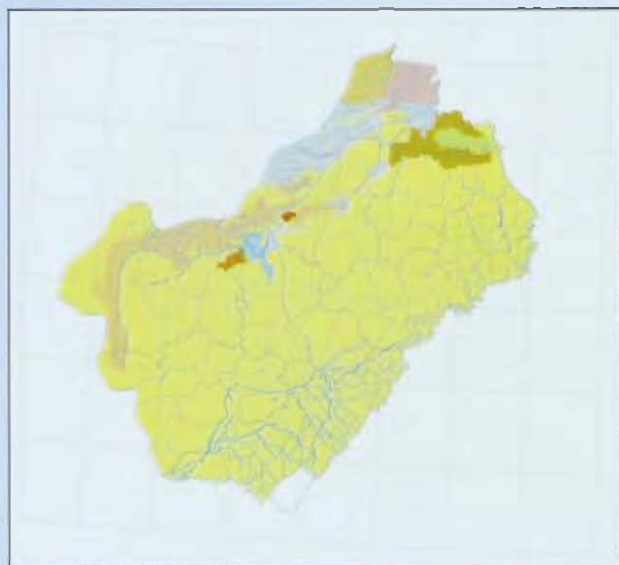


Diagnostics: Pond heron → 33-36 cm; C: Adult: Sexually dimorphic. Male: A 'hunchbacked' and buff bird with purplish-yellow bill and greenish-horny legs. Crown to tail black, buff wing patch visible in flight only; sides of head and neck greyish-pink or vinous; throat and neck whitish; upper breast and flanks ochre; lower breast blackish-maroon; central abdomen, vent and under tail-coverts almost white. Female: Chestnut-brown above, including shoulder patch; chestnut-rufous below and rufous streaked. Juvenile: Heavily streaked above and below. **Voice:** Occasional wuk, deep krok, or keck eck eck eck. **Habitat:** Jheels, marshes, lakes and streams with tall reeds at edges. **Habits:** Solitary, rarely in pairs, most active at dusk, remains hidden in thick vegetation at the edges of water bodies when disturbed feigns freezing, breeds singly from May to September, nests usually in dense reed bed. **Food:** Fish, frog, crustaceans, molluscs and aquatic insects. **Status and Distribution:** Resident, nomadic, mainly distributed in plains; up to 1800 m in Kashmir where it commonly breeds, and also in Assam; Pakistan and Bangladesh; C Asia. **Threshold number:** 250.

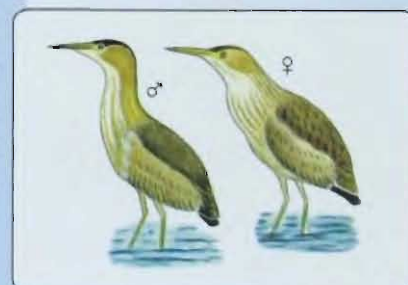


21. *Ixobrychus sinensis* (Gmelin, 1789)

Yellow Bittern

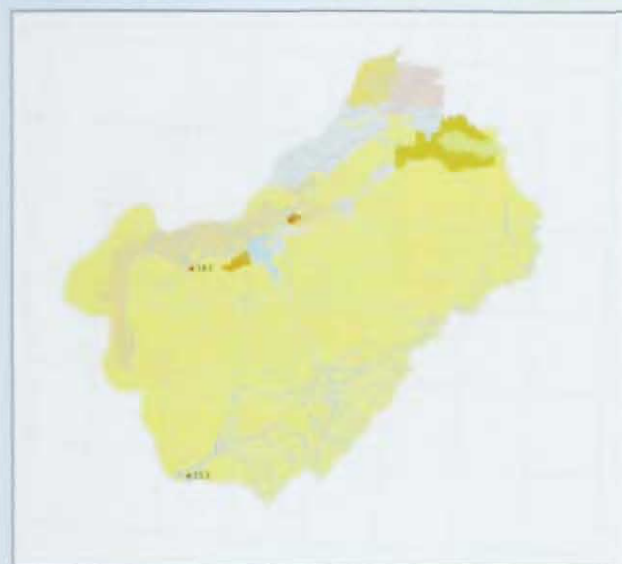


Diagnostics: Pond heron -; 37-38 cm; C; *Adult*: Sexually dimorphic. *Male*: Crown and crest black with dark flight feathers; remaining back chiefly yellowish-brown; rump dark ashy; tail slaty-black; bill yellowish-horny; chin, throat and foreneck pale yellowish; sides of upper breast with buff streaks; rest of underparts buffish; legs and feet yellowish. *Female*: Almost similar except for a buff mesial line down the throat. *Juvenile*: More rufous-brown above with broad buff fringes on all feathers; streaked below; the mesial line more pronounced. **Voice:** Usually silent. **Habitat:** Scrubby swamps with reeds, inundated paddy fields in company with Chestnut Bittern. **Habits:** Generally crepuscular and nocturnal, active on cloudy day; also feigns freezing, breeds from June to September, nests in red bed or bushes at the edges of pond. **Food:** Very voracious feeder on fish, frog and aquatic insects. **Status and Distribution:** Resident, nomadic, scattered, uncommon, absent in peninsula; Pakistan; Nepal; Bangladesh; Sri Lanka; Maldives.

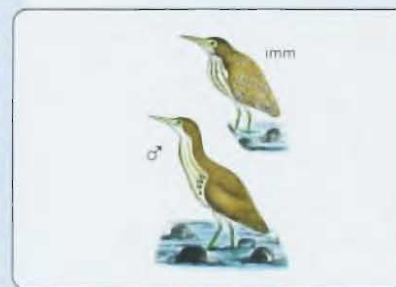


22. *Ixobrychus cinnamomeus* (Gmelin, 1789)

Chestnut Bittern

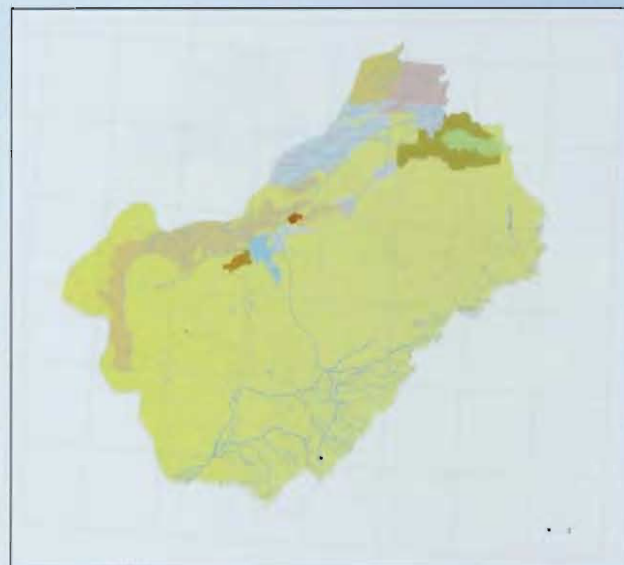
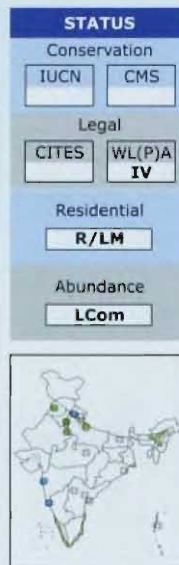
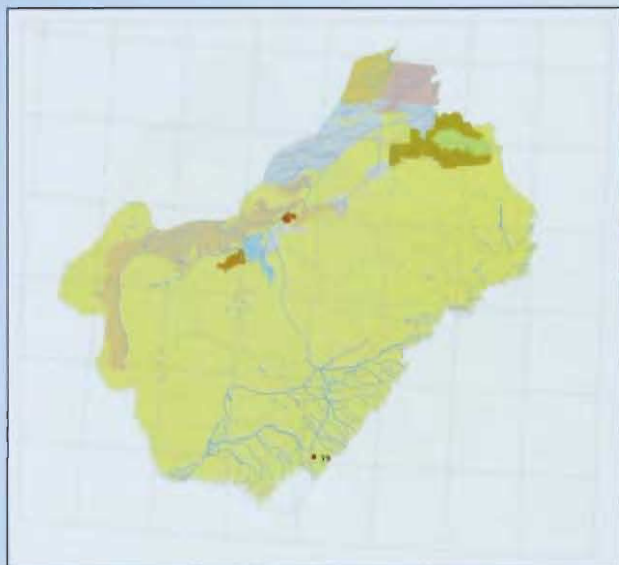


Diagnostics: Pond Heron-; 38-40 cm; C; **Adult:** Sexually dimorphic, **Male:** Upper plumage chestnut-cinnamon, wing-coverts paler; chin, throat and upper foreneck white with a dark median stripe down the foreneck; a patch of black, buff- edged feathers on each side of upper breast largely concealed by elongated breast feathers; remaining under plumage and wings pale chestnut; bill yellow; legs and feet yellowish-green. **Female:** Darker; chestnut-brown above with blackish crown; wings mottled buff and brown; buff- rufous below with dark brown striation from chin to vent and a streak down middle of foreneck and breast. **Juvenile:** Like female, but mottled above and heavily streaked below. **Voice:** Normally silent, utters a loud kok-kok. **Habitat:** Reedy beds of jheels and marshes, paddy fields, mangroves etc. **Habits:** Non-gregarious, crepuscular, generally occurs in company of Yellow Bittern, seen during day only upon emerging from long grasses, breeds from May to September, nests on bent-over reeds about one metre above water. **Food:** Consumes large quantity of fish, frog, molluscs and aquatic insects. **Status and Distribution:** Resident, nomadic, scattered throughout India, Andaman and Nicobar Islands, Saurashtra; Pakistan; Nepal; Bangladesh; Sri Lanka; Maldives; SE Asia and NE China; S Japan.



23. *Dupetor flavicollis* (Latham, 1790)

Black Bittern

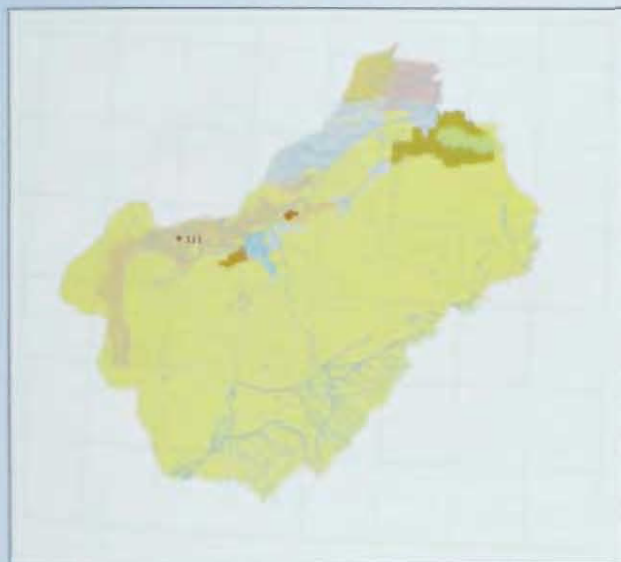


Diagnostics: Pond Heron +; c 58 cm; C; *Adult:* Sexually dimorphic. *Male:* Upper plumage slaty-grey to black with bluish sheen. Bill reddish-horny with yellowish tip and terminal half of lower mandible; chin and throat white with rufous dotted line down the middle; yellowish patch on either side of neck; upper breast dark slate with buff-white margins on feathers; breast, abdomen and remaining under plumage slaty-grey to brownish-black; legs and feet dark brown. *Female:* Brown above and paler below with streaks on breast. *Juvenile:* Crown blackish; upperparts dark brown with rufous scalloping; underparts mottled chestnut and buff. **Voice:** Usually silent, harsh *queh*, a loud booming during breeding season. **Habitat:** Occur in reedy swamps and ditches in forest with overgrown seepage and submerged bushes. **Habits:** Generally crepuscular (active in early morning and dusk) and nocturnal, non-gregarious, feigns freezing, breeds from May to September; nests in reeds or in a dense thicket in a marsh. **Food:** Devours large fish, frog, molluscs and aquatic insects. **Status and Distribution:** Resident, nomadic and widespread; but uncommon throughout India; Pakistan; Nepal; Bangladesh; Sri Lanka. **Threshold number:** 1000.



24. *Botaurus stellaris* (Linnaeus, 1758)

Great Bittern



STATUS

Conservation

IUCN

CMS

II

Legal

CITES

WL(P)A

IV

Residential

WM

Abundance

Rare

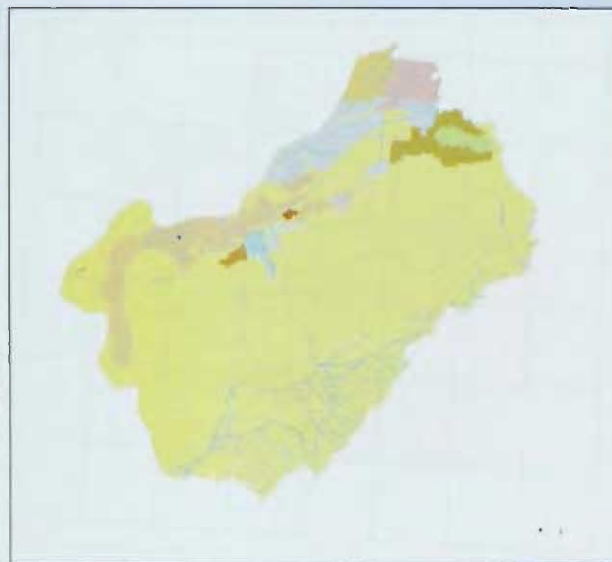
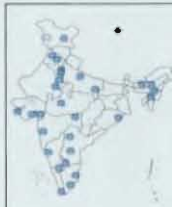


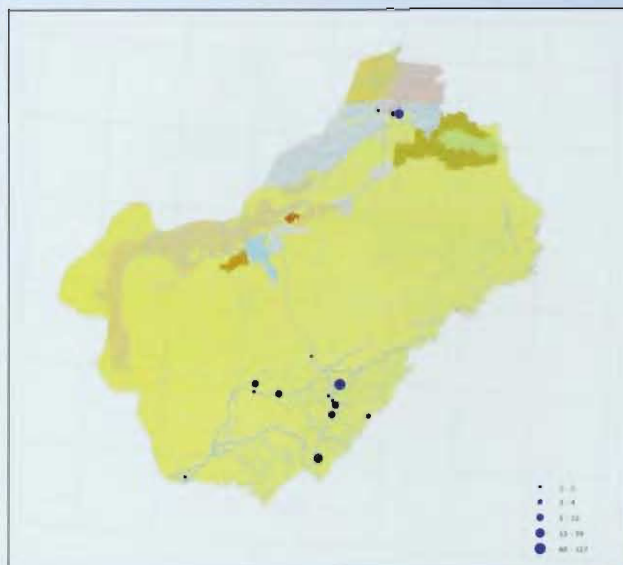
Photo: Jugal Tiwari

Diagnostics: Pond Heron +; 70-80 cm; C; **Adult:** Sexes alike. Crown, nape and upper back black; sides of head yellowish-orange faintly dotted with black; remaining back, rump and tail yellowish-buff, profusely barred and mottled with black. Bill greenish-yellow; lores green to bluish; chin and throat white with a conspicuous buff and black median line that continues down the overhanging yellowish plumes; remaining underparts yellowish-buff with narrow brownish bars on sides of breast; legs and feet greenish-yellow. **Juvenile:** Upper parts pale chestnut to reddish-brown and underparts reddish-buff, except for whitish chin and throat. **Voice:** Silent during winter, *aurr* in flight. **Habitat:** Inland jheels, marshes and swamps with thick overgrown beds of *Phragmites* and *Typha*. **Habits:** Found singly, crepuscular, nocturnal and shy, remains hidden in reed beds, feeds alone, feigns freezing. **Food:** Chiefly fish, frog, aquatic invertebrates, occasionally small birds and rodents. **Status and Distribution:** Winter migrant, rare, mainly from NW to NE India; Pakistan; Nepal; Bangladesh; Sri Lanka; Maldives; breeds in C Asia, winters in S Asia.



25. *Mycteria leucocephala* (Pennant, 1769)

Painted Stork

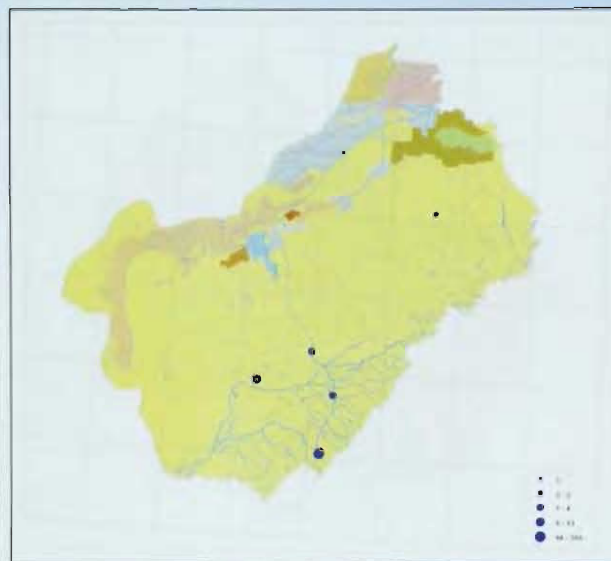


Diagnostics: Vulture \pm ; 93-100 cm; C; **Adult:** Sexes alike; long-legged, long-necked, large black and white bird with orange-yellow bill and face; plumage white; wings blackish-green and white, breast band and tail-quills black; wing-coverts with rich rosy-pink wash; legs and feet fleshy-brown. **Voice:** Adults silent except bill rattling. **Habitat:** Inland lakes, reservoirs, marshes, inundated fields and riverbanks. **Habits:** Generally found in small groups; breeds in large colonies from August to March when flocks with chicks may be found roosting on trees in mixed heronries; roosts gregariously on trees, also on sandbanks and mudflats. **Food:** Chiefly fish, frog, occasionally aquatic insects and reptiles. **Status and Distribution:** Resident, nomadic, widespread and locally common in plains, non-breeding summer migrant to Himalayan foothills; Pakistan; Nepal; Bangladesh; Sri Lanka. **Remarks:** There are an estimated 15,000 individuals in South Asia and fewer than 10,000 in South-East Asia, with populations declining throughout. Although it is thus considered "one of the most numerous and secure of Asian storks", this is more a reflection of the rarity and endangerment of most other storks in the region than of the security of this species. The increasing impact of habitat loss, disturbance, pollution and hunting of adults and collection of eggs and nestlings from colonies is cause for concern (BirdLife Int., 2001). **Threshold number:** 150.



26. *Anastomus oscitans* (Boddaert, 1783)

Asian Openbill-Stork

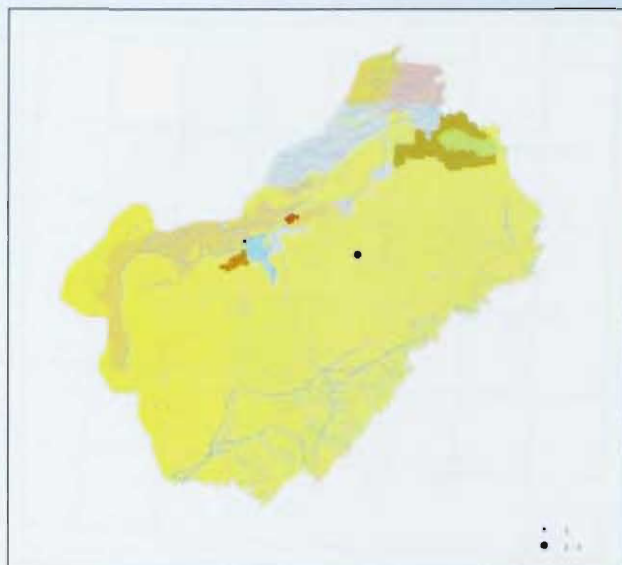
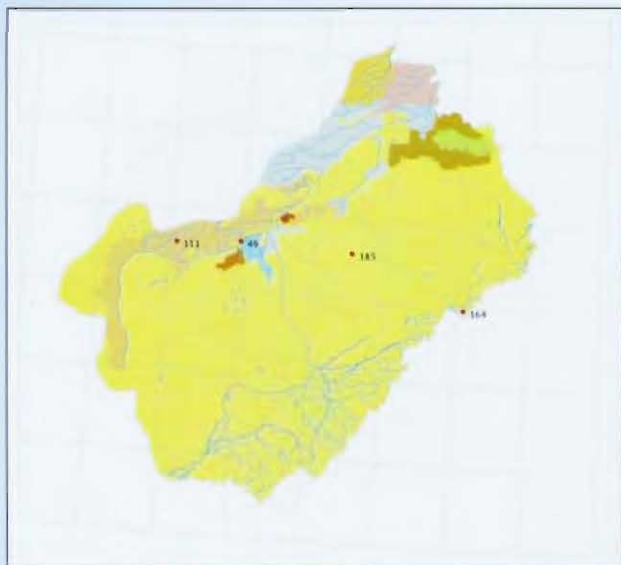


Diagnostics: large duck =; 68-81 cm; C; *Adult:* Sexes alike; a small stork with white plumage; greenish-black scapulars, wings and tail; dull greenish-horny bill with arching mandibles, showing a gap in-between at close range. In non-breeding season the white plumage of the upper parts is replaced with pale smoky-grey. *Juvenile:* Smoky brown-grey with blackish brown mantle; gap in bill develops slowly. **Voice:** Silent. **Habitat:** Jheels, marshes, shallow wetlands such as lakes and reservoirs, paddy fields, riverbeds, etc. **Habits:** Found singly or in small flocks, congregates at the time of nesting; breeds in large mixed heronries from July to April; nests in trees near water. **Food:** Feeds in shallow water on molluscs, frogs, fishes and other small animals. **Status and Distribution:** Resident, nomadic, locally common, widely distributed in India; Pakistan; Nepal; Bangladesh; Sri Lanka; SE Asia. **Threshold number:** 1250.



27. *Ciconia nigra* (Linnaeus, 1758)

Black Stork

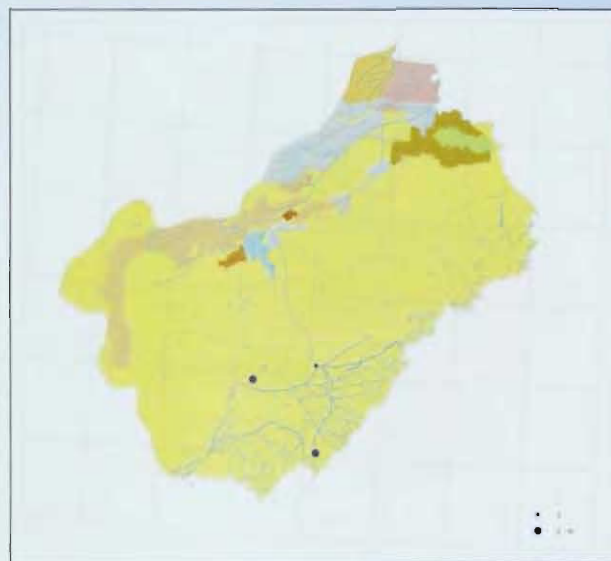
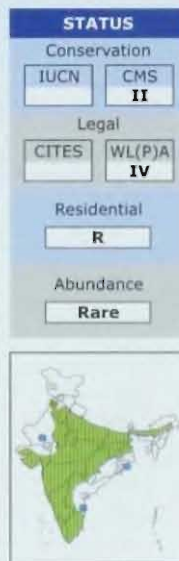
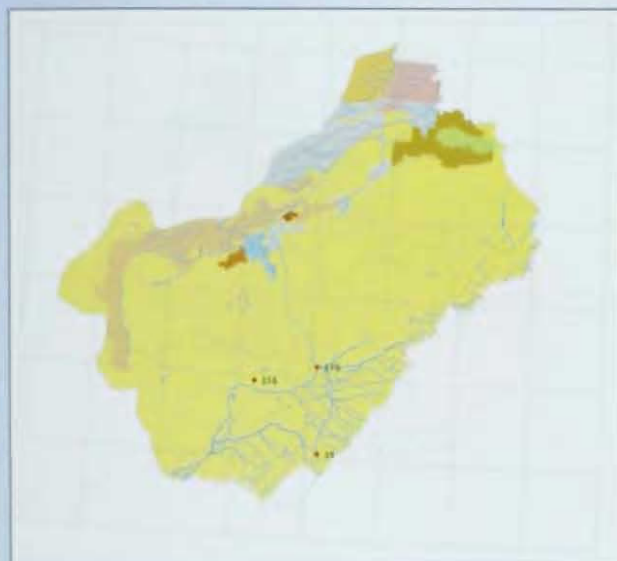


Diagnostics: White Stork \pm ; 90-100 cm; C; *Adult*: Sexes alike; a black stork with contrasting white underparts; scarlet bill and legs; plumage black with varying sheen; purple, green and bronze on upperparts; brilliant green on neck; mixed green and purple on breast except underparts. *Juvenile*: Head, neck and upper breast with pale-tipped dark own feathers; mantle brownish-black; underparts white. **Voice:** Invariably silent. **Habitat:** Marshes, riverbanks, freshwater lakes, etc. **Habits:** Generally in pairs or in small flocks, shy and prefers Riverine areas. **Food:** Chiefly frog, fish, aquatic invertebrates. **Status and Distribution:** Winter migrant, widespread, uncommon, more common from NW to NE India; Pakistan; Nepal; Bhutan; Bangladesh; Sri Lanka; breeds in W & C Asia, winters in Pakistan & India to Myanmar. **Threshold number:** 100.



28. *Ciconia episcopus* (Boddaert, 1783)

White-necked Stork

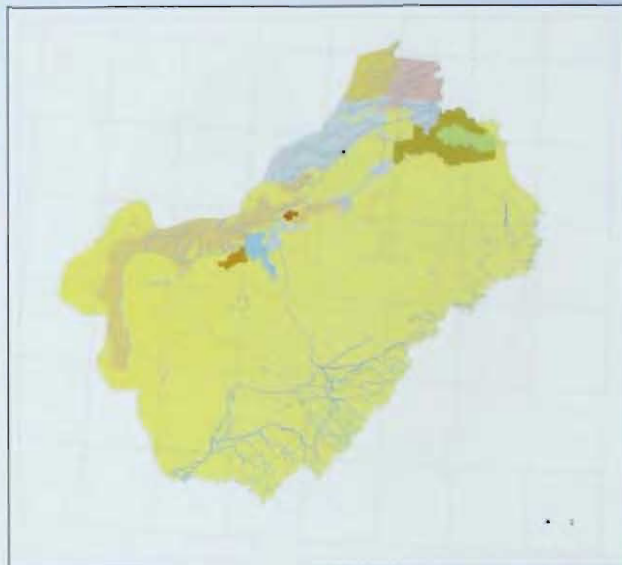
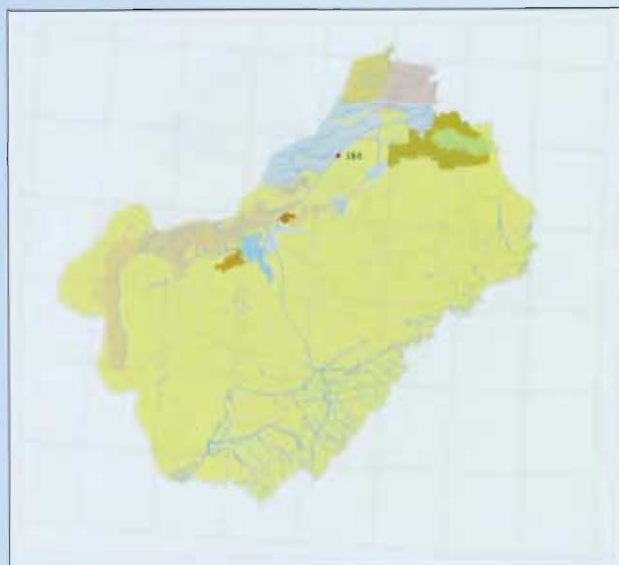


Diagnostics: Goose \pm ; 75-92 cm; C; **Adult:** Sexes alike; a large black and white stork with conspicuous white neck, black cap and red legs. Bill black, tinged crimson-red at tip and gape; crown black with green sheen; rest of plumage black, glossed purple or greenish-blue, except lower abdomen, under tail-coverts and tail which are white. **Juvenile:** Has neck feathers longer and stuffer; glossy black replaced by dark brown. **Voice:** Silent. **Habitat:** Flooded grasslands, fallow, irrigated ploughed fields, rain-filled ponds, marshes, marshy stream, rivers, etc. near open forests or groves. **Habits:** Generally solitary, in pairs or sometimes in small groups; seldom wades in water; roosts on tall trees at night; breeds individually from July to April; builds a solitary nest on top of a tree. **Food:** Chiefly frogs, reptiles and aquatic invertebrates, occasionally fish, also on swarming termites. **Status and Distribution:** Resident, sparsely distributed in the well-watered parts of India, more frequent in Peninsula; Pakistan; Nepal; Bhutan; Bangladesh; Sri Lanka. SE Asia. **Threshold number:** 250.



29. *Ephippiorhynchus asiaticus* (Latham, 1790)

Black-necked Stork

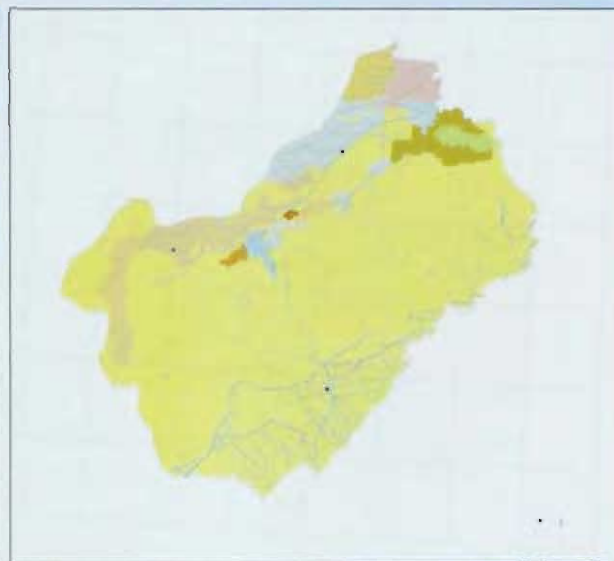
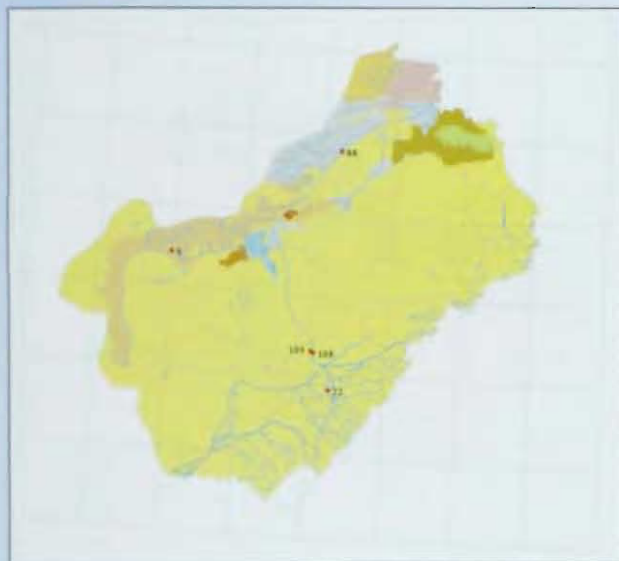


Diagnostics: Painted Stork +; 129-150 cm; C; **Adult:** Sexes alike except for colour of iris, brown in male and yellow in female. A black and white stork with black neck and bill and coral red legs; black head and neck with varying sheen; copper-bronze on occiput and nape, and purple-green-blue on rest; back, scapulars, innermost secondaries and median wing-coverts black with green sheen; remaining plumage white. **Juvenile:** A dull replica of adult. **Voice:** Silent. **Habitat:** Lowland freshwater marshes,heels, large rivers, occasionally mangrove swamps and coastal mudflats, and flooded crop fields. **Habits:** Invariably solitary or in well-separated pairs or with family after breeding season, wary; wade in shallow water, squat on dry ground at the edge. Breeds from September to December, solitary nest on large trees in large marshes; also frequents close to habitation and canals with low or no persecution by humans. **Food:** Mainly fish, occasionally frog, reptiles and crabs. **Status and Distribution:** Resident, rare, found in north, northwest and northeast plains; Pakistan; Nepal; Sri Lanka, SE Asia. **Remarks:** The combined population of South and South-East Asia does not to exceed 1000 individuals. The species is threatened by a variety of factors including drainage of wetlands, felling of nest trees, development, encroachment of agriculture or aquaculture, over fishing, overgrazing, hunting and excessive capture for zoos (BirdLife Int., 2001, Wetland Int., 2002). **Threshold number:** 10.



30. *Plegadis falcinellus* (Linnaeus, 1766)

Glossy Ibis

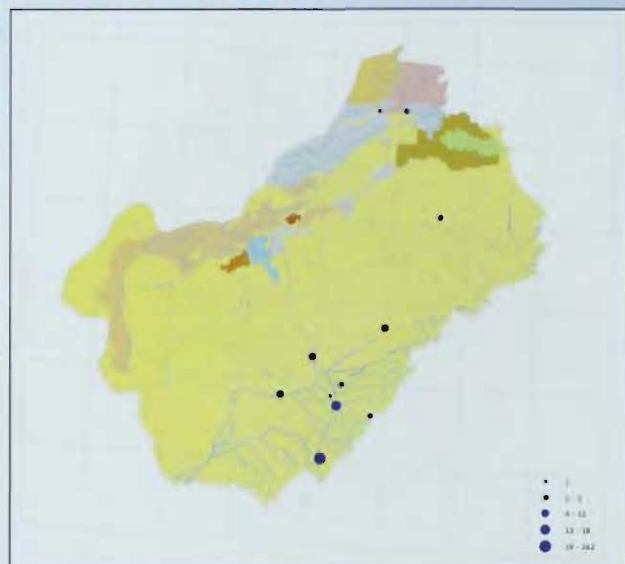


Diagnostics: domestic hen \pm ; 52-65 cm; C; *Adult:* Sexes alike; a dark Ibis with long, de-curved plumbeous-brown bill, feathered head and bronze-brown feet. *Breeding:* Upperparts maroon-brown with green and purple dark sheen on head, neck, chin, throat, lower back, and rump; tail black glossed with green and purple; underparts chestnut, axillaries and under tail-coverts deep purple. *Non-breeding:* Head and neck brown, white-streaked; scapulars and innermost wing-coverts glossy green-blue. *Juvenile:* Like adult in winter, but unglossed ashy-brown above and all brown below. No white streaks on neck. **Voice:** Generally silent. **Habitat:** Large lakes, marshes, flooded grasslands and paddy fields. **Habits:** Gregarious and shy; small to large flocks of 40 to 50 birds; feed in shallow waters; breeds colonially in mixed heronries from May to July; nest on trees in or near water. **Food:** Chiefly molluscs, crustaceans and aquatic insects. **Status and Distribution:** Resident, nomadic, partly winter migrant; occurs mainly in S India; Assam, Gangetic plains, Gujarat, Orissa, Madhya Pradesh, Rajasthan, West Bengal, Manipur; Pakistan; Nepal; Bangladesh; Sri Lanka; Maldives; C & SE Asia. **Threshold number:** 250.



31. *Threskiornis melanocephalus* (Latham, 1790)

Oriental White Ibis

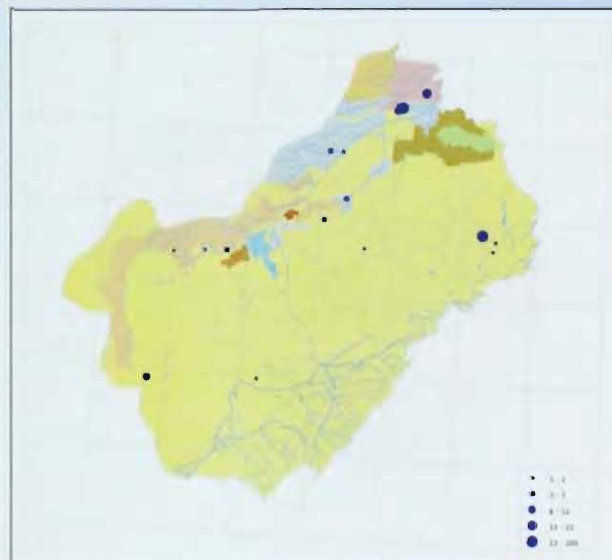


Diagnostics: **Hen** ±; 75 cm; **C; Adult:** Sexes alike; an unmistakable white bird with long decurved black bill, naked bluish-black head and neck, and glossy black legs and feet. In flight, blood red patches of bare skin on flanks and underwing conspicuous. **Breeding:** Long ornamental plumes round base of neck; elongated disintegrated inner secondaries; some slaty-grey in wings. **Non-breeding:** Neck-plumes elongated inner secondaries and ordinary feathers replace slaty-grey ones in wings. **Juvenile:** Head and neck feathered except face and patch around eye; patch of bare skin under wing black, not blood-red as in adult. **Voice:** Normally silent. **Habitat:** Rivers, jheels, freshwater marshes, reservoirs, tanks, paddy fields, occasionally tidal mudflats and lagoons, etc. **Habits:** Generally gregarious, occurs in moderate to large flocks in company with storks, egrets and spoonbills; strolls actively in mud and shallow water; breeds in mixed colonies from June to March; nest- a stick platform on trees in or near water. **Food:** Carnivorous, chiefly fish, frogs, molluscs and aquatic insects. **Status and Distribution:** Resident, nomadic, uncommon, widespread and locally common in the west, scarce in the east; possibly increasing locally due to spread of man-made wetlands; Pakistan; Nepal; Bangladesh; Sri Lanka. **Remarks:** It is vulnerable to drainage, disturbance, pollution, agricultural conversion, hunting and collection of eggs and nestlings from colonies. **Threshold number:** 100.



32. *Pseudibis papillosa* (Temminck, 1824)

Black Ibis

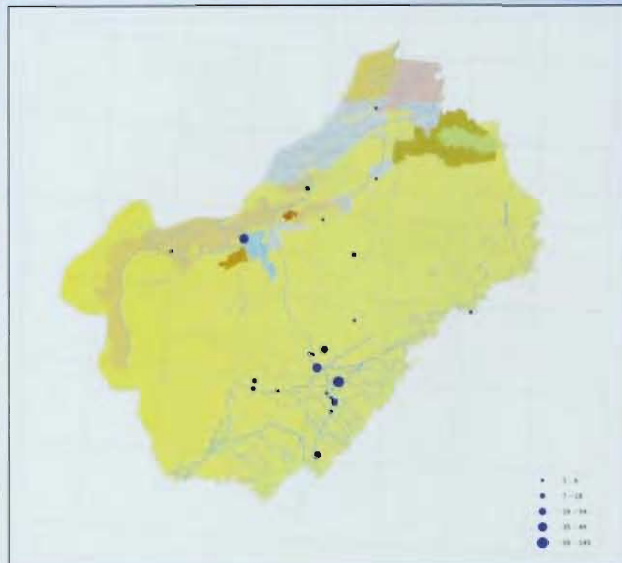


Diagnostics: domestic hen \pm ; 68 cm; C; **Adult:** Sexes alike. Blackish-brown bird with long decurved dull green bill, a small white shoulder patch and brick-red legs. Head black, with a triangular patch of brilliant red warts; upper plumage brown with bronze-green sheen on scapulars and back; remaining plumage black with purple-blue sheen; tail black, glossed with blue-green. **Juvenile:** Dull brown. **Voice:** Generally silent. **Habitat:** Dry grasslands, cultivated agricultural fields, lakes, marshes and riverbeds, sometimes around rubbish dumps. **Habits:** Generally forages on margins of lakes and reservoirs in small flocks of 4-10, gregarious; breeds individually or in small groups of 3-5 pairs from June to March; nests on large trees. **Food:** Generally frogs, fish and aquatic insects, occasionally lizards, scorpions. **Status and Distribution:** Biome Restricted Species. Resident, widespread in India; Pakistan; Nepal; Bangladesh. **Threshold number:** 100.



33. *Platalea leucorodia* Linnaeus, 1758

Eurasian Spoonbill



Diagnostics: Duck +; 60 cm; C; **Adult:** Sexes alike, female slightly smaller; a snow-white bird with characteristic long, flat, spatula-shaped black bill, the terminal half of the spoon yellow; tawny patch on lower foreneck; black legs and feet. **Breeding:** A pure white nuchal crest of pointed plumes. **Non-breeding:** The crest has moulted. **Juvenile:** Primaries black-tipped and black-shafted, the first three largely mottled with black. **Voice:** Very silent. **Habitat:** Large lakes, marshyheels, reservoirs, rivers, swamps, lagoons and creeks. **Habits:** Gregarious, occur in small to medium mixed flocks of up to 50 or more birds, forages in early morning or evening or at night, spends most of the day resting or sleeping with the bill tucked under the wings. Breeds in colonies in large mixed heronries generally from July to January, nest a platform of sticks on trees standing in water. **Food:** Chiefly small fishes, frogs and aquatic invertebrates, occasionally phytoplankton. **Status and Distribution:** Mainly resident, partly local migrant; almost all through the plains except C and E India, Pakistan; Nepal; Bangladesh; Sri Lanka; Maldives, C, SW&S Asia. **Threshold number:** 230



34. *Phoenicopterus ruber* Linnaeus, 1758

Greater Flamingo



STATUS

Conservation

IUCN

CMS

II

Legal

CITES

WL(P)A

II

IV

Residential

R/WM/LM

Abundance

LCom

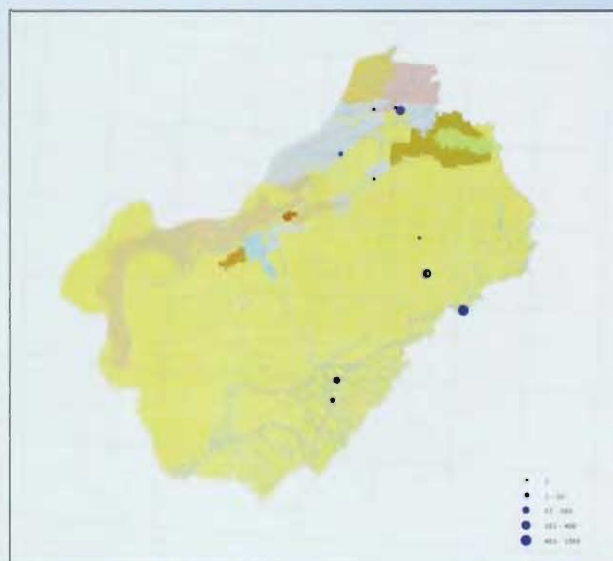
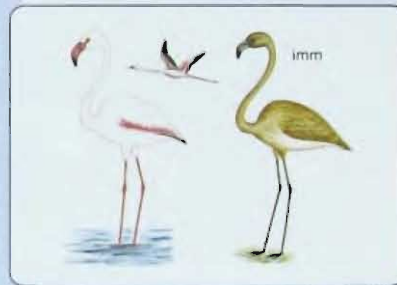


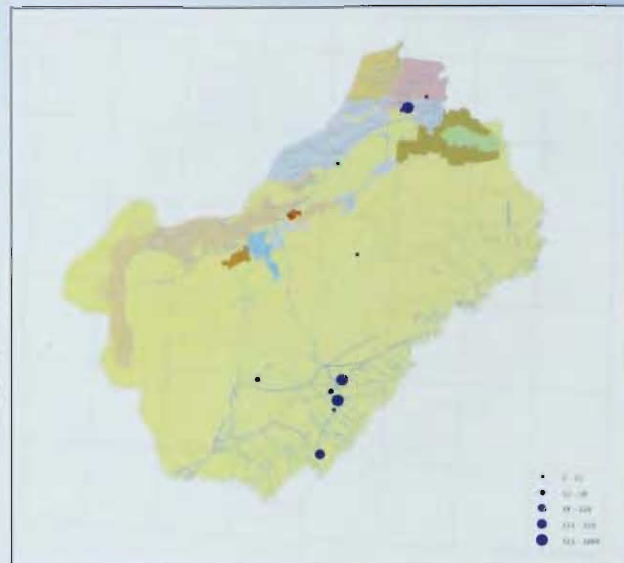
Photo: Gehan de Silva Wijeyeratne

Diagnostics: Vulture +: 125-145 cm; C/H: *Adult:* Sexes alike, female smaller and generally with less pronounced rose colour. A tall, white, stout-legged and long-necked bird with a large sharply de- curved massive pink bill, edge of upper mandible and terminal third black; legs and feet pinkish-red. Plumage rose and white, wings black and scarlet. In flight, the long neck and legs stretched to full length with contrasting black and scarlet underwing. *Juvenile:* Greyish-brown with brownish bill and dark plumbeous legs. **Voice:** Goose like honk. **Habitat:** Large shallow brackish water lakes, salt pans, estuaries, lagoons and also freshwater jheels. **Habits:** Highly gregarious; occurs in small groups to huge flocks numbering into thousands; breeds in colonies from July to April; nest conical mound of mud with shallow pan-like depression at top. **Food:** Mainly comprising chironomid larvae, small molluscs, crustaceans and seeds of aquatic plants, seldom fish. **Status and Distribution:** common in the coastal and inland regions of Gujarat, salt pans, Gulf of Kachchh (where it breeds in large numbers from September to April) and Gulf of Khambhat. Also about two thousand birds visit Pulicat Lake (Andhra Pradesh) and Chilika Lake (Orissa). A few birds occasionally recorded from Keoladeo National Park; the species has also been visiting Sambhar Lake (Rajasthan) regularly; Pakistan; Nepal; Bangladesh; Sri Lanka; Maldives; E. Mediterranean, SW Asia. **Threshold number:** 2500.



35. *Phoenicopterus minor* (Geoffroy, 1798)

Lesser Flamingo



Diagnostics: large duck =; 90-105 cm; H/C; **Adult:** Sexes more or less alike, female smaller and paler, without crimson on scapulars, back or breast; comparatively smaller flamingos with much deeper rose-pink plumage, dark bill with crimson-red centre and crimson feathers around base, and red legs and feet. In flight, the contrasting crimson and black underwing is prominent. **Juvenile:** Greyish-brown with darker bill. **Voice:** Goose like hoot higher than greater flamingo. **Habitat:** Prefers more saline waters than Greater Flamingo; brackish water lakes and lagoons, salt pans. **Habits:** Gregarious, frequently found in company with Greater Flamingo; sieves the diatoms from water surface when walking or swimming. Breeds in Little and Great Rann of Kachchh during June-July but may take place up to January. **Food:** Chiefly algae and plankton, occasionally insect larvae, regularly drinks fresh water. **Status and Distribution:** Resident and locally common in Great and Little Rann of Kachchh, in non breeding season partly disperse to Sambhar lake (Rajasthan), rare in western Gangetic plains, Chilika lake, Andhra Pradesh; Pakistan. **Remarks:** The global population is c. 5,000,000, including c.150,000 in Asia, but declines have been suggested for much of Africa. It breeds in huge colonies on large, undisturbed alkaline and saline lakes, and is adapted to respond to local environmental changes in sites by moving elsewhere, and thus depends on a network of suitable areas. **Threshold number:** 1500.



36. *Dendrocygna javanica* (Horsfield, 1821)

Lesser Whistling-Duck

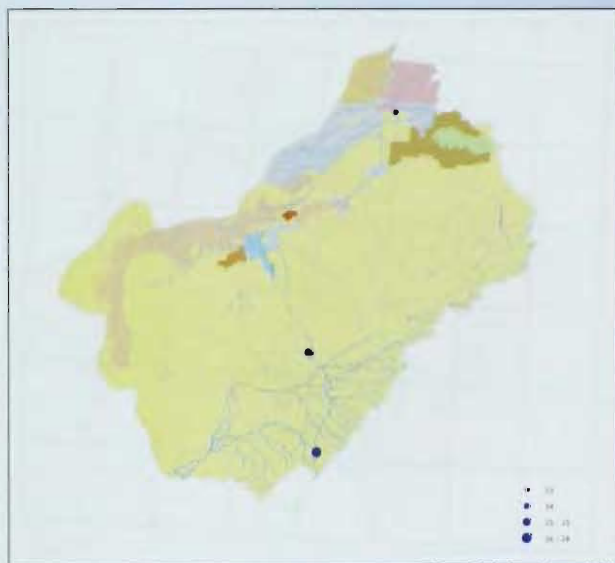
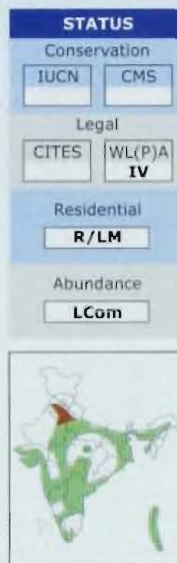
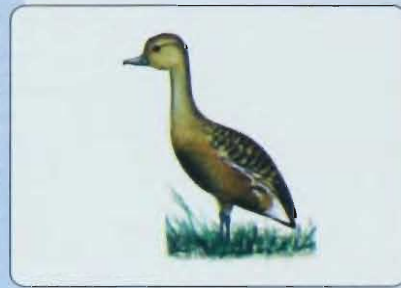


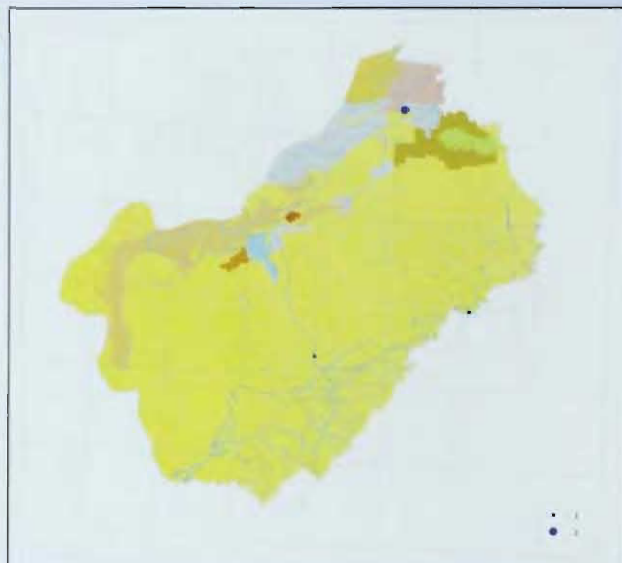
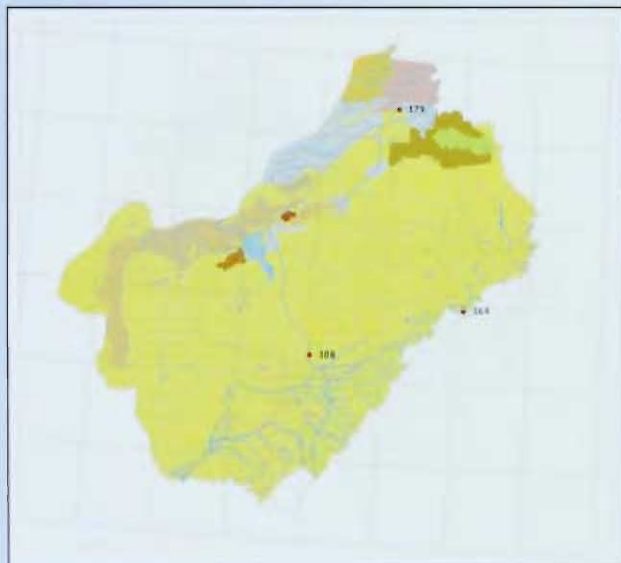
Photo: K. Chaiyan

Diagnostics: domestic duck ~; 40-45 cm; H/C; **Adult:** Sexes alike; small brown and chestnut ducks with slaty-grey bill and plumbeous-blue legs. Forehead and crown brown; remaining head and neck fulvous-grey; hind neck reddish-brown changing into brown on the scapulars and back; flanks chestnut; rump black, upper tail-coverts uniformly chestnut; tail brown; underparts chestnut. **Juvenile:** Duller in colour. **Voice:** wheezy whistling shrill. **Habitat:** Generally found in reedy freshwater marshes, shallow pools, lakes with emergent vegetation and submerged trees in plains. **Habits:** Gregarious, sociable, keeps in groups of 10 to 15, sometimes in large flocks as well, in and around weedy tanks, roosts on trees during daytime near water. Breeds from June to October, in natural hollow of ancient tree trunks. **Food:** Mainly vegetarian comprising aquatic plants, arable crops and also frogs, fish, molluscs and insects. **Status and Distribution:** Resident, nomadic, all India, including Andaman and Nicobar Islands; Nepal; Pakistan; Sri Lanka; Bangladesh; E & SE Asia upto W Indonesia. **Threshold number:** 10,000.



37. *Anser anser* (Linnaeus, 1758)

Greylag Goose

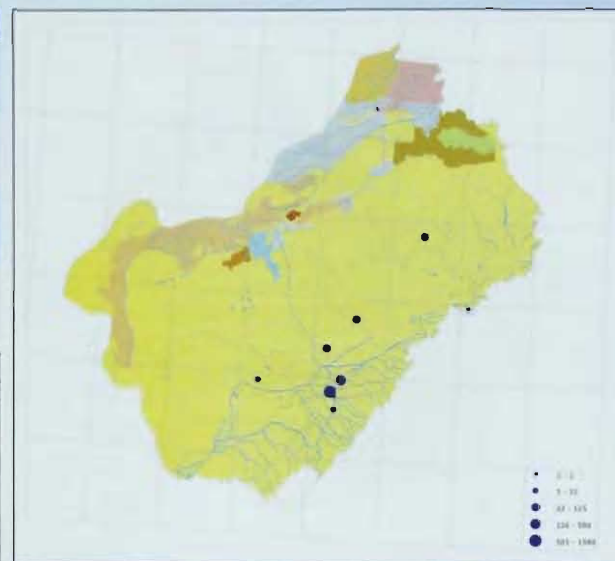


Diagnostics: domestic goose \pm ; 75-90cm; H; *Adult*: Sexes alike. A large, grey-brown goose with pink bill and legs; a very narrow white rim of feathers at base of bill; ash-brown head and neck; pale or grey back and rump; white upper tail-coverts and vent. **Voice:** Loud honking with repeated *aahng-ung-ung* while in flight and *gag-gag-gag* when feeding. **Habitat:** Lakes, reservoirs, large rivers, tanks, grass lands and arable crops in neighborhood of wetlands. **Habits:** Shy and reserved; assembles in large numbers where food is in abundance generally on large jheels; feeds by grazing on wet grasslands or crops mainly during the night, daytime is spent swimming or resting; arrives through NW India and Kashmir in October and November. **Food:** Major source is land plants, grasses and arable winter crops such as wheat and gram. **Status and Distribution:** Mostly passage winter migrant, common in NW India, rare in Assam, Manipur, Orissa, Gujarat, Rajasthan, Madhya Pradesh, Karnataka; Pakistan; Bhutan; Bangladesh; Sri Lanka. Breeds in C Asia, winters in C & South Asia. **Threshold number:** 150.



38. *Anser indicus* (Latham, 1790)

Bar-headed Goose

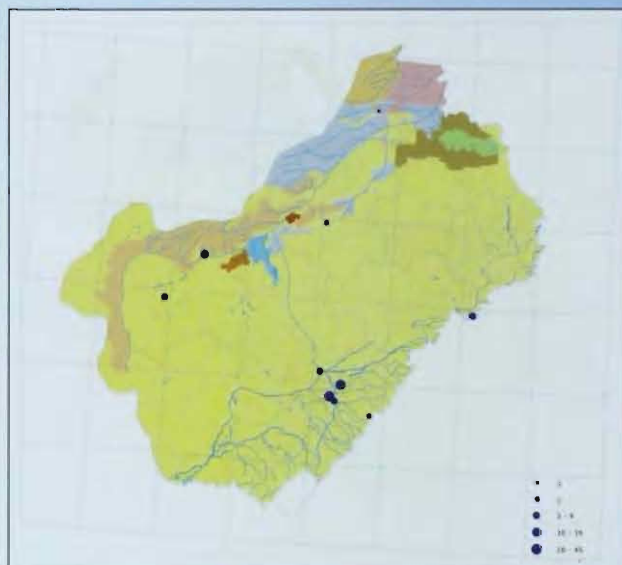
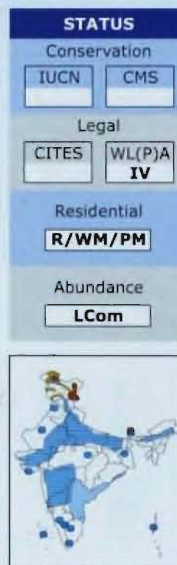


Diagnostics: Greylag Goose -; 71-76 cm; H; **Adult:** Sexes alike; an ashy-grey, white and brown goose; head white with two black bars, one across the snicuput from eye to eye and the other shorter below on nape; neck brown with a white stripe on each side; face, throat, chin, vent and under tail-coverts white; breast ashy; bill yellow with black tip; upper plumage pale ashy, each feather with whitish edge; scapulars darker; flanks brown; lower back, primaries and rump grey; tail grey with white tip; legs yellow. **Juvenile:** Like adult but paler and without black bars on head and white stripes on neck. **Voice:** Like that of Greylag Goose. **Habitat:** Generally occurs on large jheels and rivers, breeds in swampy high-altitude lakes in Ladakh, winters on rivers, reservoirs and jheels in plains, also coastal islands. **Habits:** Generally gregarious; nocturnal feeder in grasslands on riverbanks, often raiding arable crops. Birds rest on sandbanks in daytime, wary and shy in winter because of hunting. Breeds in high-altitude lakes in C Asia including Tibet, in Ladakh around 4300 m, viz, Pan gong Tso, Tso Moriri and Tsokar lakes from May to June, slight depression in ground on grassy islets in the lakes. **Food:** Exclusively vegetarian, comprising arable winter crops, grasses, tubers and paddy stubble. **Status and Distribution:** Common throughout Northern India to Rajasthan, Gangetic plains, Assam, Orissa, Gujarat, Karnataka; Pakistan; Nepal; Bhutan; Bangladesh; Myanmar. Breeds in C Asia including Ladakh; winters in China, S Asia.



39. *Tadorna ferruginea* (Pallas, 1764)

Brahminy Shelduck

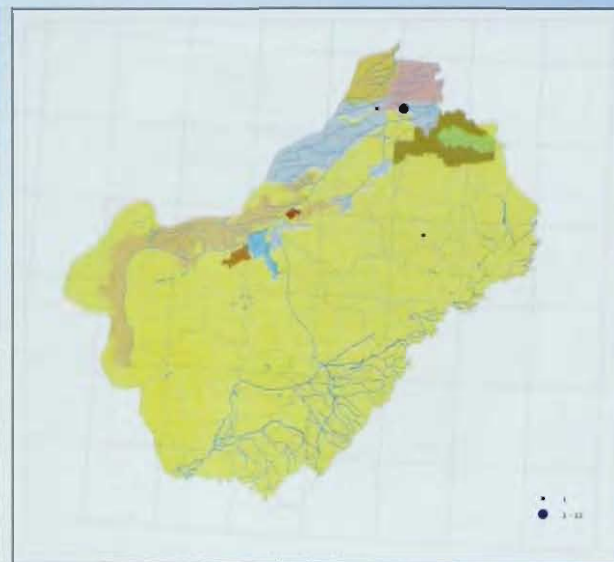


Diagnostics: large domestic duck =; 61-67 cm; O; *Adult:* A large bright orange-brown duck with pale buff head and neck; black beak, feet and tail; white wing-coverts and a prominent metallic green speculum. *Male:* In breeding season develops a narrow black collar on lower neck. *Female:* Whiter head and without black collar. *Juvenile:* Like female but duller with a grey wash on scapulars and tertiaries. **Voice:** Loud clanging *aang-aang*, both on ground as well as flight. **Habitat:** Breeds around high altitude brackish water lakes in Ladakh, Sikkim and Nepal; common winter migrant to large open lakes and rivers with extensive shingle banks and mudflats across the country. **Habits:** Generally found in pairs or small flocks, but large congregations can be seen on northern lakes and reservoirs, feeds by grazing on banks; breeds around high-altitude lakes and swamps in May and June; nest a thick pad of white down in a hole or fissure in a cliff far from water. Arrives in plains of India by October/November and most depart by April, though stray birds may be found up to even June. **Food:** Almost omnivorous, comprising grains, aquatic plants, algae and aquatic invertebrates. **Status and Distribution:** Mainly winter migrant all over India. Breeds around high-altitude lakes and swamps above 4000 m in Ladakh, viz., Pangong, Tsokar and Tso Moriri Lakes, Sikkim and Nepal; winters in southern half of its breeding range; SE Asia. **Remarks:** The bird is also popularly known as "Surkhaab" or "Chakwa-Chakwi" in folklore. **Threshold number:** 500.

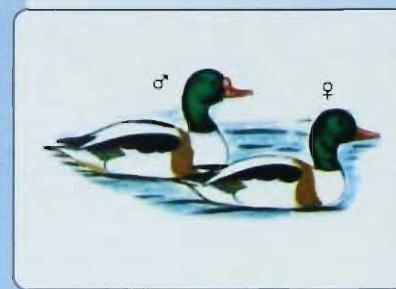


40. *Tadorna tadorna* (Linnaeus, 1758)

Common Shelduck

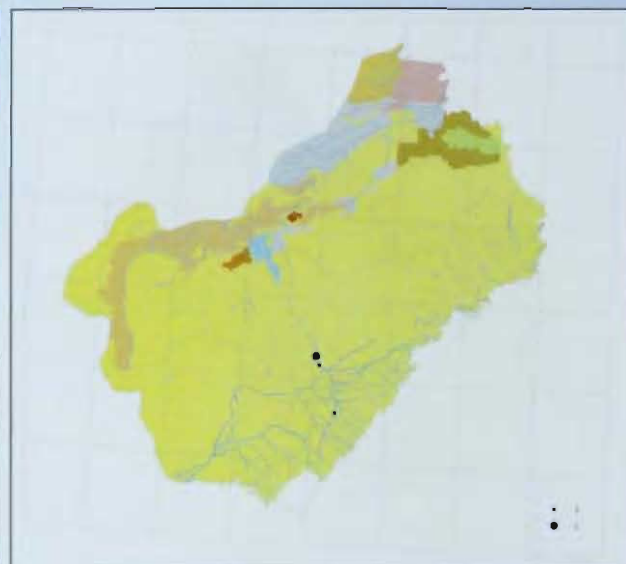
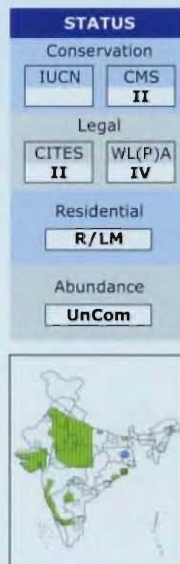
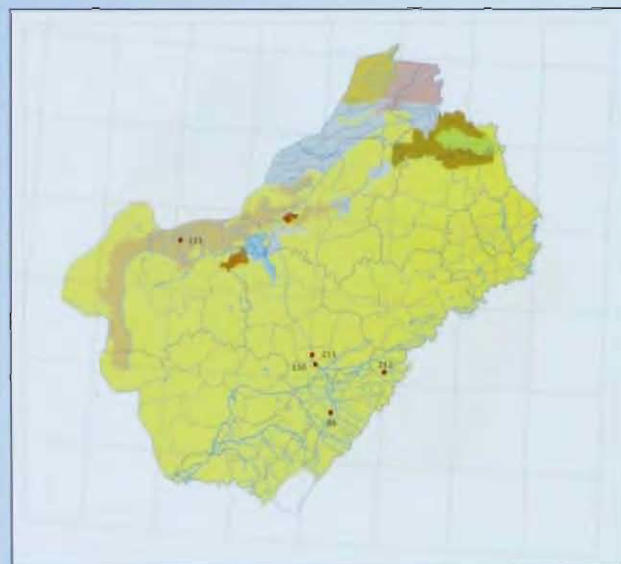


Diagnostics: domestic duck \pm ; 58-67 cm; C/H; **Adult:** A distinctive white and black duck with a broad chestnut breast-band, glistening greenish-black head and neck, glossy green speculum bordered above with chestnut, black tail-tip, bright red bill and pink legs. **Male:** Has a conspicuous red knob above base of bill and a broad black band from breast to vent. **Female:** Is considerably smaller, dull coloured and without red knob. **Male (in eclipse):** Head dull blackish with little sheen; feathers of lower black band with white tips. **Juvenile:** Chestnut breast-band absent, sometimes sides slightly suffused with chestnut. **Voice:** Almost silent. **Habitat:** Open lakes, large rivers, mudflats and coastal waters. **Habits:** Generally more gregarious than Brahminy, occurs in small flocks, feeds by walking on mudflats, which it often frequents. **Food:** Chiefly carnivorous, comprising molluscs, aquatic arthropods, also algae, seeds. **Status and Distribution:** Uncommon and irregular winter migrant to India up to 15° N, mostly in NE; Pakistan; Sri Lanka; Nepal; Bhutan; Bangladesh. Breeds in C Asia, winters in S Asia. **Threshold number:** 1,000.

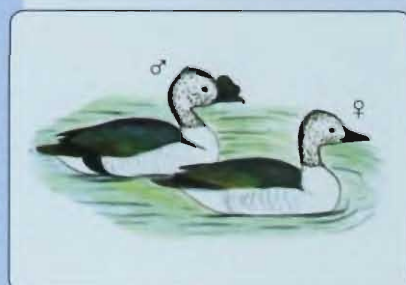


41. *Sarkidiornis melanotos* (Pennant, 1769)

Comb Duck

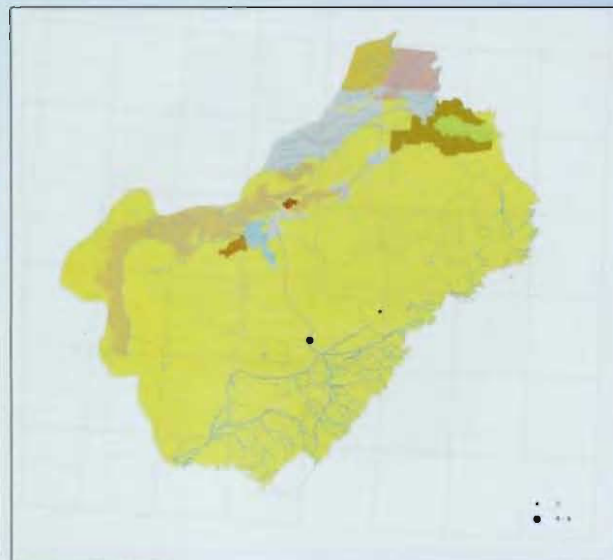


Diagnostics: domestic duck \pm 56-76 cm; H:C A large glossy blue-black and white duck. **Male:** Head and neck white, speckled with black, coalescing on crown, nape and hind neck; bill and comb (swollen fleshy knob) black; a black demicollar on each side of upper breast; another broad black band in front of under tail-coverts, remaining underparts white; upper back black glossed with green and blue, except scapulars, which are glossed with purple; speculum bronze; lower back grey; tail dark brown; legs and feet plumbeous. **Eclipse plumage** absent. **Female:** Smaller, duller and without comb on bill, demicollar on upper breast and black band near tail. **Juvenile:** Black upperparts less glossy than in female; lower back and rump dull greyish-white; upper tail-coverts and tail dull brown. **Voice:** Generally silent. **Habitat:** Reedy tanks, jheels, irrigation tanks with plenty of aquatic vegetation, lowland pools in wooded areas. **Habit:** Usually occurs in small flocks of 5 to 30 birds, rarely up to a hundred; feeds by grazing in marshes and wet grasslands, readily perches on trees. Breeds during SW monsoon (July-September), nest in a large hollow in ancient tree near water. **Food:** Chiefly vegetarian, aquatic plants, shoots, seeds, arable crops, also aquatic insects. **Status and Distribution:** Resident, nomadic; but uncommon almost all over India; Pakistan; Nepal, Bangladesh; Sri Lanka; Myanmar; SE Asia. **Threshold number:** 60.

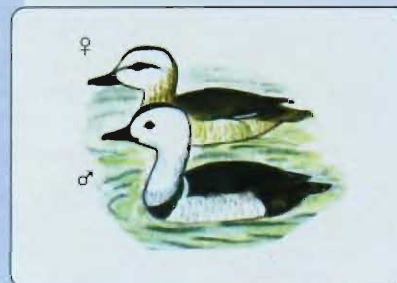


42. *Nettapus coromandelianus* (Gmelin, 1789)

Cotton Teal

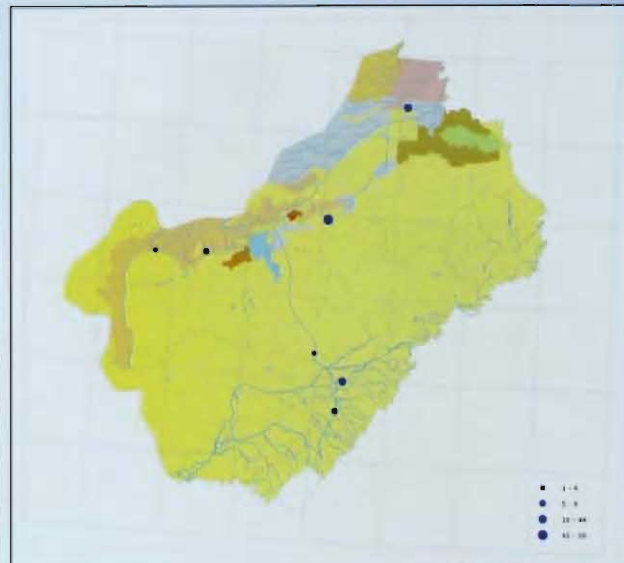


Diagnostics: Partridge =; 30-37cm; H/C; The smallest Indian duck. **Male:** Chiefly black and white with a prominent black collar round the lower neck. Head and neck white with blackish, green-glossed crown; bill black; iris crimson-red; back blackish-brown, completely overlaid with dark green gloss slightly mixed with purple, distinct white wing-bar prominent in flight; underparts white; tail brown; legs black. **Female:** Dull brown, a dark line through eyes, indistinct white wing-bar. **Male (in eclipse):** Like female but darker above, distinct white wing-bar. **Voice:** Short, sharp cackle quack, quack-quacky on wing. **Habitat:** Village tanks, ponds, vegetation covered pools and channels. **Habits:** Usually in pairs during breeding season, otherwise small flocks up to 50 to 500 birds, sometimes perch on overhanging branches. Breeds during June-September, nest a natural hollow in a tree trunk near water. **Food:** Chiefly vegetarian, comprising aquatic plants, arable crops, but also crustaceans and insect larvae. **Status and Distribution:** Resident, almost throughout India up to 300 m, though only locally common in peninsula; Pakistan; Nepal; Bangladesh; Sri Lanka; Maldives. **Threshold number:** 1,000.

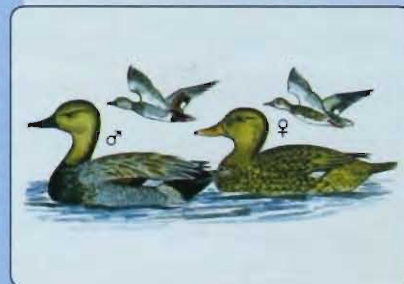


43. *Anas strepera* Linnaeus, 1758

Gadwall

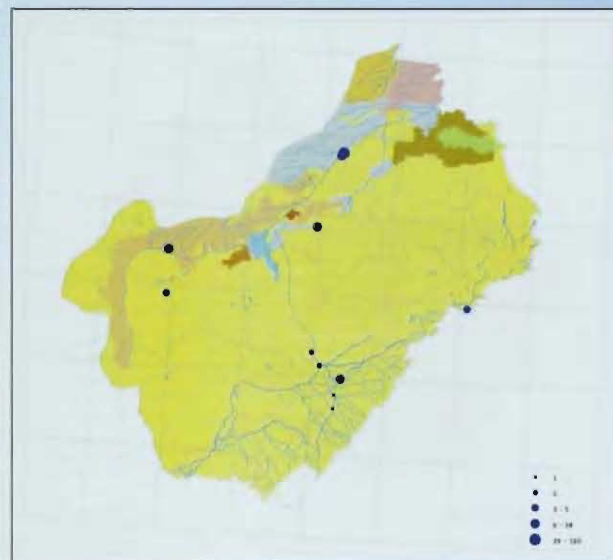
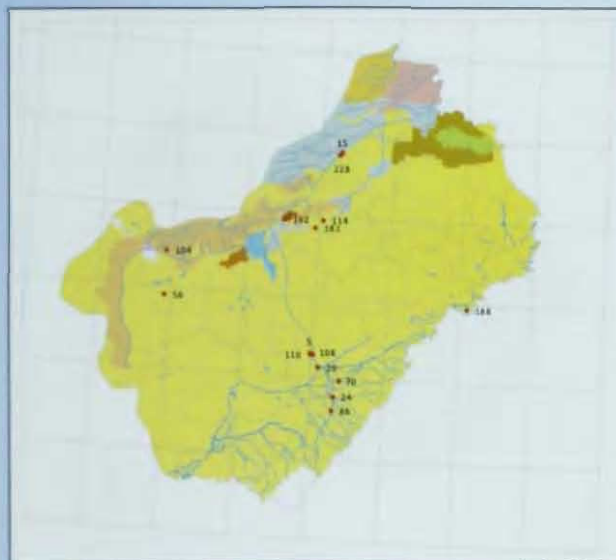


Diagnostics: domestic duck; 45-51cm; H/C; *Male*: Body generally dark brown and grey; belly whitish; tail velvety-black; breast with crescent markings; chest nut patch with the black-and-white speculum etc. are diagnostics. *Female*: Like female Mallard, but duller and smaller with white inner secondaries, chestnut on wing and orange-yellow legs. *Male* (in eclipse): Like female, but greyer and less heavily marked above. **Voice:** loud quack when alarmed. **Habitat:** Freshwater reedy marshes and wheels with extensive aquatic and emergent vegetation, open water spread of dams and reservoirs. **Habits:** Gregarious, usually found in small flocks of 10-30 birds. Surface feeding duck, predominantly vegetarian; shy and wary, keeps near emergent vegetation. **Food:** Primarily vegetarian, comprising aquatic plants and grains of arable crops, occasionally molluscs and aquatic insects. **Status and Distribution:** Commonly and widely distributed winter migrant all over India, though more frequent in SW India; Pakistan; Nepal; Bhutan; Bangladesh; Sri Lanka. Breeds in C Asia, winters S Asia. **Threshold number:** 1500.



44. *Anas penelope* Linnaeus, 1758

Eurasian Wigeon



Diagnostics: domestic duck/Gadwall -; 45-51 cm; **H/C:** Male: Distinctive creamy patch on forehead contrasting with rusty-red head and neck; finely pencilled grey body; blue-grey bill with black tip; vinous-red breast; metallic green speculum bordered with black; white under plumage; black tail-coverts. Female: Mottled brown; similar to male in eclipse but much duller, less reddish-brown, the dark vermiculation less coarse, the lesser wing-coverts grey. The more rufous plumage and metallic green speculum differentiate it from rather similar female Gadwall (speculum contrasting white and black). Male (in eclipse): Reddish-brown with black vermiculation above and chiefly white below. **Voice:** Male whee-oo, both on wings and in water, female short quack. **Habitat:** Freshwater shallow reedy jheels, marshes, open lakes, reservoirs, rivers and also pools, avoid deep waters overgrown with vegetation. **Habits:** Highly gregarious, large flocks are common, feeds chiefly by grazing on edges, sometimes dabbles at water surface. **Food:** Chiefly vegetarian, comprising aquatic plants, algae, grasses, seeds, arable crops, occasionally aquatic animals. **Status and Distribution:** Wide spread and common winter migrant in north, Assam, Manipur, Orissa; Pakistan; Nepal; Bhutan; Bangladesh; Sri Lanka. Breeds in C Asia, winters in S Asia. **Threshold number:** 2,500.



45. *Anas platyrhynchos* Linnaeus, 1758

Mallard

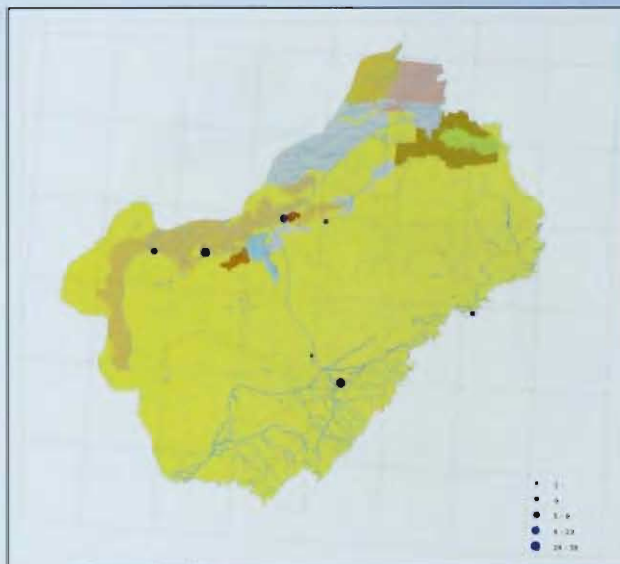
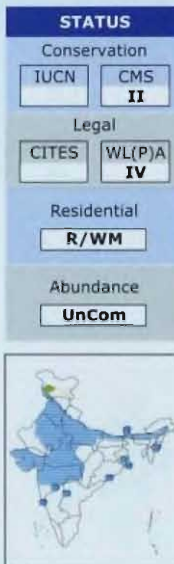
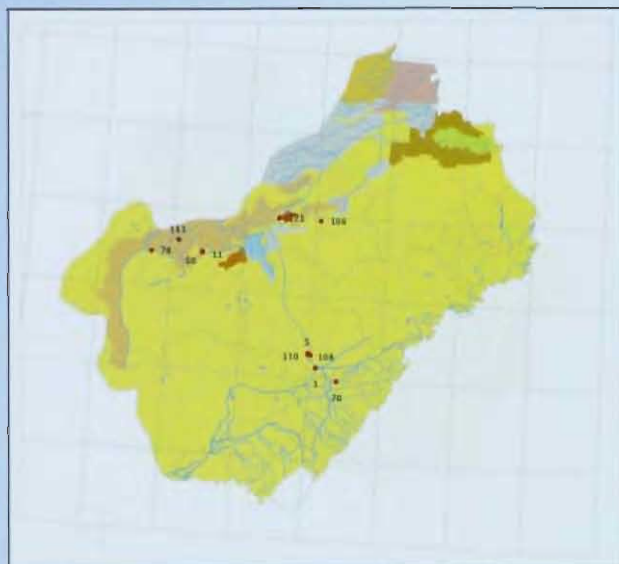
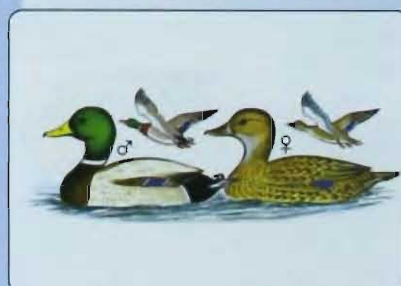


Photo: Satpal Gandhi

Diagnostics: domestic duck =; 50-65 cm; H/C; **Male:** Head and upper neck glistening metallic dark green separated from chestnut breast by narrow white collar; bill dull olive-yellow; above and below largely grey; rump, tail-coverts and two up curled central tail-feathers black; speculum glossy bluish-purple. **Female:** Brown and buff, streaked and spotted with black; chin, throat and foreneck plain buff; irregular dark line through eye; orange legs; distinguished from the very similar female Shoveller by bill shape and purple-blue speculum (vs. green). **Male (in eclipse):** Like female; however, head darker; upper plumage back to tail much like the breeding plumage; moulted curly tail feathers. **Voice:** Male: soft *kreep*, female laughing *quack-quack*. **Habitat:** Occurs in shallow freshwater jheels, marshes, reservoirs, lakes, rarely rivers and ponds. **Habits:** A gregarious dabbling duck keeps in small flocks, sometimes up to 50, mostly feeds at night, usually wary; breeds in very small numbers in lakes of Kashmir (Hokarsar and Anchar) from May-July; nest bed of dry grass, leaves and birds own down. **Food:** chiefly vegetarian, comprising arable winter crops such as wheat and gram, aquatic plants, sometimes molluscs, fish fry and tadpoles. **Status and Distribution:** Winter migrant, almost throughout India; though uncommon, becoming rare in peninsula; Pakistan; Nepal; Bhutan; Bangladesh. Breeds in C Asia, winters in S Asia. **Threshold number:** 750.



46. *Anas poecilorhyncha* J.R.Forster, 1781

Spot-billed Duck

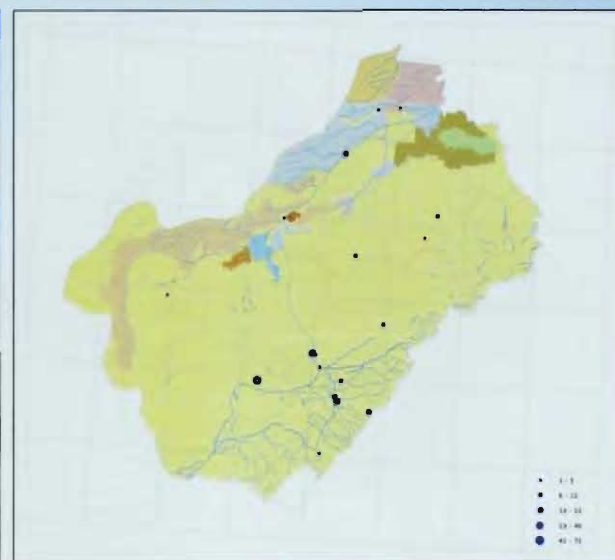
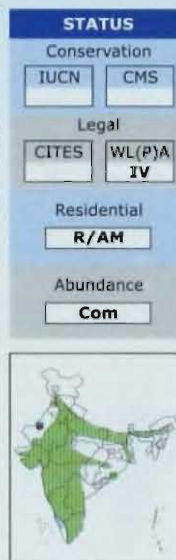


Photo: Rakash Kumar

Diagnostics: domestic duck =; 58-63 cm; H/C; **Male:** A large, blackish-brown duck with scaly-patterned plumage; bill black and yellow (terminal third or less), tip black; two swollen orange-red spots at the base of bill on either side of forehead; crown from forehead to nape dark brown; remaining head and neck buff-white; eye-stripe dark and broad; pale edged feathers; speculum glossy green with narrow black-and-white margins; tail darker; legs and feet coral-red. **Female:** Has less conspicuous loreal spots, slightly smaller and duller than male. **Juvenile:** Like adult but paler, without red spots at base of bill and less spotted below. **Voice:** Like Mallard, male hoarse, female loud quack. **Habitat:** Freshwater vegetation covered Jheels, lakes, reservoirs, marshes and tanks with extensive emergent vegetation, rarely on rivers. **Habits:** Sociable, usually occurs in pairs though during breeding season females with chicks are not a rare sight, in non-breeding period flocks up to 50 are found; feeds by dabbling or by walking in marshy vegetation; breeds from July to December, nest, pad of grass and weeds in dense vegetation at margins. **Food:** Mainly vegetarian, comprising aquatic plants, their seeds and arable crops such as rice, occasionally aquatic insects. **Status and Distribution:** Wide spread Resident throughout India up to 1800 m in Kashmir; Pakistan; Nepal; Bhutan; Bangladesh; Sri Lanka. Breeds in C Asia, winters in S Asia. **Threshold number:** 500.



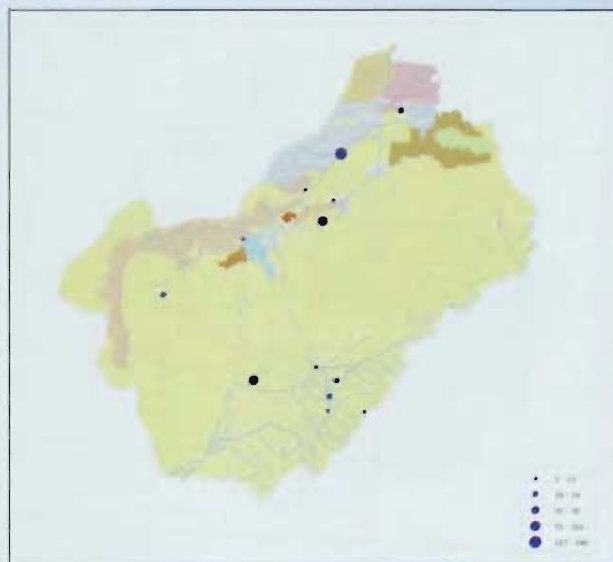
47. *Anas clypeata* Linnaeus, 1758

Northern Shoveller



48. *Anas acuta* Linnaeus, 1758

Northern Pintail

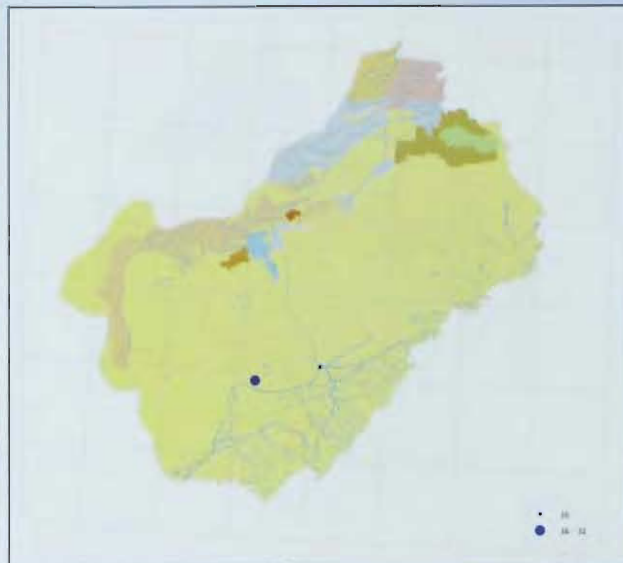


Diagnostics: domestic duck-; 56-75cm; H/C; **Male:** Head, face and neck chocolate-brown; nape black; bill plumbeous; either side of neck with white-stripe joining down to white neck and breast; neck finely pencilled silver-grey; speculum metallic bronze-green; upper tail-coverts grey edged with black; undertail-coverts black with broad buff patch in front. Tail long, pointed pin-like. **Female:** Mottled brown and buff with pointed but pinless tail and without prominent speculum. **Male (in eclipse):** Resembles female, but lacks distinctive pale edges to feathers on its back; dark ashy-grey or greyish-white coarsely vermiculated mantle. **Voice:** Silent. **Habitat:** Lakes, marshes, reedy and vegetation-covered jheels, wet paddy fields, and rivers. **Habits:** One of the commonest migratory species; highly gregarious; keeps in flocks of up to hundreds; largely crepuscular; feeds at night and roosts during day; shy and very wary; arrives in India by September-October and mostly departs by end of March. **Food:** Chiefly vegetarian, plant seeds, arable winter crops such as wheat and gram, aquatic plants, and also molluscs as well as other invertebrates. **Status and Distribution:** Common and widely distributed winter migrant to India; Pakistan; Sri Lanka; Nepal; breeds in C Siberia and C Asia.



49. *Anas querquedula* Linnaeus, 1758

Garganey

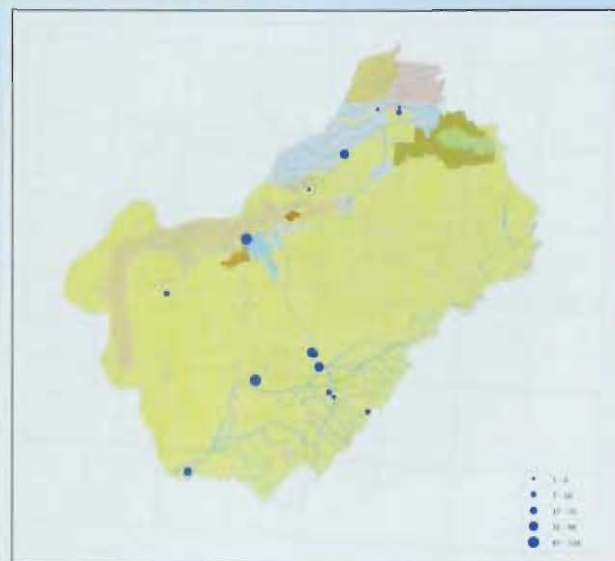


Diagnostics: domestic duck -; 37-41 cm; H/C; *Male:* A small brown teal with conspicuous white eyebrows; bluish-grey forewings, prominent in flight; head and neck pinky-brown; bill brownish-black with black nail; upper plumage blackish-brown with pale edges; scapulars long, drooping and glossy black with white median ribs; speculum green between two white bands; breast light brown, speckled black, underparts white, finely waved on sides and black spotted near vent. *Female:* Mottled brown above and white below with whitish eyebrows. *Male (in eclipse):* Like female, but with adult male wing coloration. **Voice:** Generally silent but female quack like Common Teal. **Habitat:** Frequents almost all types of wetlands including jheels, marshes, lakes, reservoirs, rivers and village ponds with plenty of vegetation. **Habits:** Gregarious, flocks in thousands at certain wetlands, non-diving duck, nocturnal feeder, shy and wary, generally keeps in emergent vegetation. **Food:** Primarily vegetarian, comprising seeds, arable crops, occasionally aquatic insect larvae, worms and molluscs. **Status and Distribution:** All India, one of the commonest winter migrants, occurring up to 4000 m; Pakistan; Nepal; Bhutan; Bangladesh; Sri Lanka; Maldives; breeds in W & Central Siberia. **Threshold number:** 2,500.

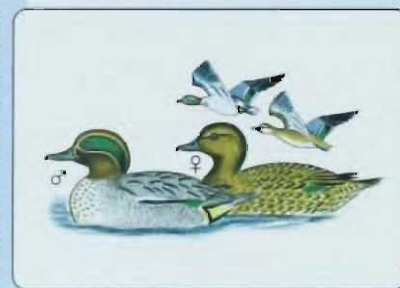


50. *Anas crecca* Linnaeus, 1758

Common Teal

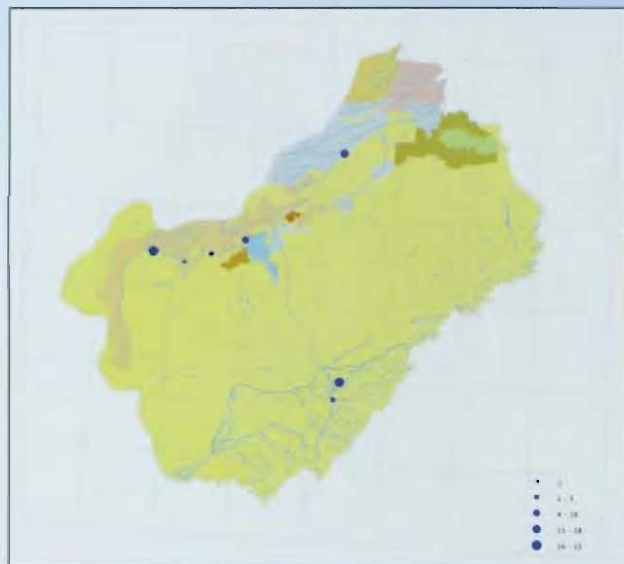
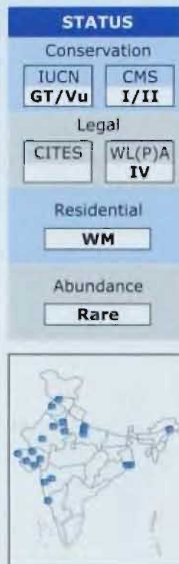


Diagnostics: half-grown domestic duck \pm ; 34-38cm; H; **Adult:** A small duck with a distinctive tricoloured (black, metallic green, and buff) speculum— particularly conspicuous in flight; black bill; olive-grey to deep slaty-blue legs. **Male:** Pencilled grayish; head dark chestnut with a broad metallic green band surrounding the eye and running back to the nape. A narrow whitish line from the bill running back towards the eye and then dividing to surround the green band; breast and flanks vermiculated dark brown and white; abdomen white or pale buff; tail brown; feathers pale edged; under tail-coverts buff laterally, black in centre. **Female:** Has mottled brown and buff plumage with pale belly; black and green speculum. **Male (in eclipse):** Crown and nape blackish-brown. **Juvenile:** Belly spotted; secondaries shorter. **Voice:** Male, musical *krit, krit*; female short sharp *quack*. **Habitat:** Freshwater shallow inland wetlands like tanks, jheels, marshes, pools, reservoirs and rivers. **Habits:** One of the commonest and most abundant species in India, found in flocks of up to 200 or more ducks, feeds in the fields at night with other dabbling ducks. One of the earliest species to arrive by middle or end of August and continues until November (many birds moult in India), mostly departs by end of March, though may stay as late as May. **Food:** Chiefly vegetarian, comprising aquatic plants, their seeds and arable winter crops. **Status and Distribution:** Common winter migrant all over India. Breeds in W & Central Siberia. **Threshold number:** 4,000.



51. *Marmaronetta angustirostris* (Menetries, 1832)

Marbled Teal

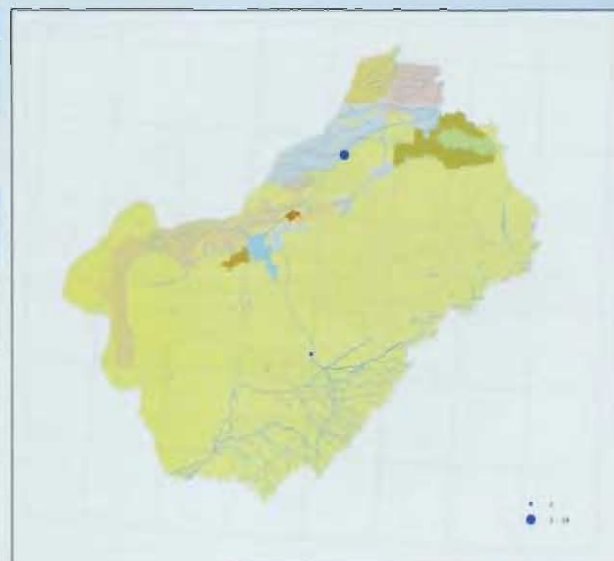


Diagnostics: domestic duck -; 39-48 cm; H/C; *Adult:* Sexes alike, female slightly smaller; small greyish-brown duck with a distinct dark brown patch from eye to nape; a slight nuchal crest; bluish-grey bill, and horny-brown legs. Above, spotted or marbled with pale greyish buff and blackish; below, more or less transversely barred brown-barred. **Voice:** Silent. **Habitat:** Occurs in shallow freshwater lakes, matted jheels, favouring shallow brackish waters rich in emergent and submerge vegetation with extensive emergent vegetation, avoid open waters. **Habits:** Generally occurs in pairs or small flocks, occasionally large flocks in winter, drops for cover after a short flight, shy and secretive, spend day hiding in vegetation. **Food:** Mainly comprise aquatic plants, and partly aquatic invertebrates. **Status and Distribution:** *Globally threatened/Vulnerable.* A rare winter migrant to N India, Madhya Pradesh, Rajasthan, Gujarat, West Bengal, Assam, Maharashtra; Pakistan; Bangladesh; breeds in SW Asia, C Asia, Extreme W China, Breeds in C Asia; winters in S Asia.

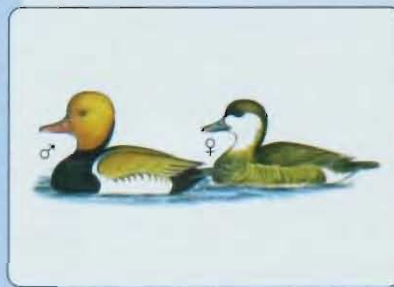


52. *Rhodonessa rufina* (Pallas, 1773)

Redcrested Pochard

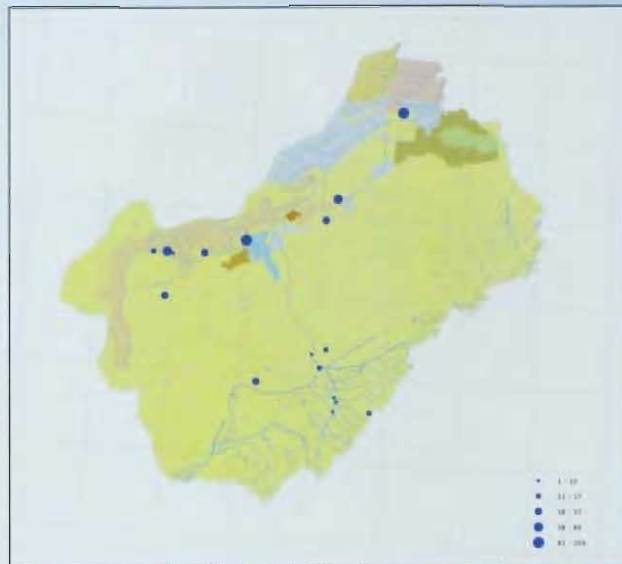


Diagnostics: domestic duck-; 53-57cm; H/C; **Male:** Head golden-orange with silky chestnut crest; bill bright crimson; neck, rump and upper tail-coverts blackish-brown; wing bases next to scapulars with white band; tail silvery-grey-brown; legs and feet dull fleshy-red. **Female:** Above pale greyish-brown; crown dark; bill dusky black with red tip, wings like male but paler and duller, white replaced by grey. **Male (in eclipse):** Like female but browner on underparts; crest bushy; the brightness of eyes, bill and feet retained. **Voice:** Silent. **Habitat:** Inhabits large jheels, reservoirs, marshes and wetlands with plenty of submerged and fringe vegetation, occasionally on rivers. **Habits:** A diving duck which prefers deep open waters, generally shy and wary, feeds in small groups though large flocks also common, feeds by diving. Arrives by October and generally departs by mid-March. **Food:** Chiefly vegetarian, comprising aquatic plants, algae, seeds, also aquatic animals. **Status and Distribution:** Winter migrant, occurs throughout the country from October to March, very common in NW India, in lesser numbers in peninsula; Pakistan; Nepal; Bhutan; Bangladesh. Breeds in W & Central Asia, winters in SW & S Asia. **Threshold number:** 1,000.

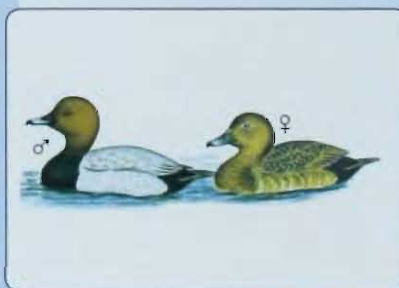


53. *Aythya ferina* (Linnaeus, 1758)

Common Pochard

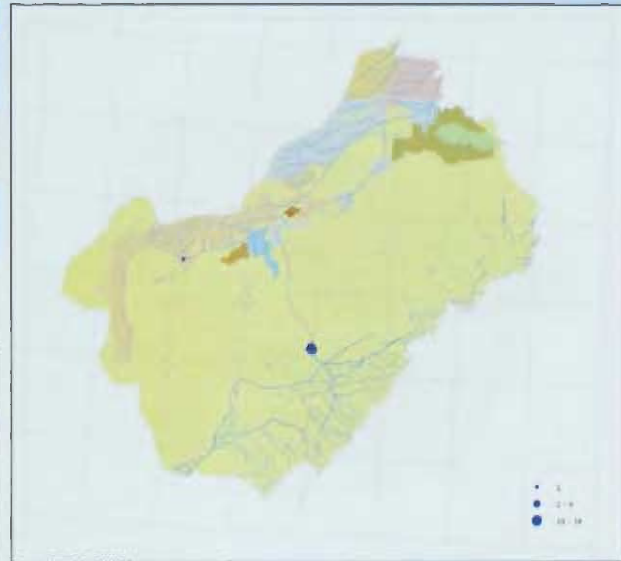


Diagnostics: domestic duck - 42-49cm; H/C; **Male:** Head and neck deep chestnut; bill black with pale grey band near tip; upper back grey; breast black; remaining underparts light grey; sides largely greyish-white; rump, upper and under tail-coverts dull black; legs slaty-blue. **Female:** Has rufous brown head, neck, upper back and breast; and dark grey-brown rump, upper and under tail-coverts. **Male (in eclipse):** Dull and more brownish than non-breeding plumage. **Voice:** Silent. **Habitat:** Frequents open parts of wheels, lakes and irrigation reservoirs with deep waters and submersed aquatic vegetation. **Habits:** One of our commonest diving ducks forming very large flocks from a few hundred to thousands of birds; feeds under water, mainly nocturnal feeder. Arrives in N India fairly late by mid-October and departs by end of March. **Food:** Chiefly vegetarian, comprising aquatic plants, algae, seeds, also occasionally molluscs, insect larvae, fish and tadpoles. **Status and Distribution:** Very common winter migrant in NW & NE India, up to ~5000 m in Sikkim; Assam, Manipur, Karnataka, Kerala, Tamil Nadu; Pakistan; Nepal; Bhutan; Bangladesh. Breeds C Asia, winters in S Asia and S China. **Threshold number:** 10,000.



54. *Aythya nyroca* (Guldenstadt, 1770)

Ferruginous Pochard

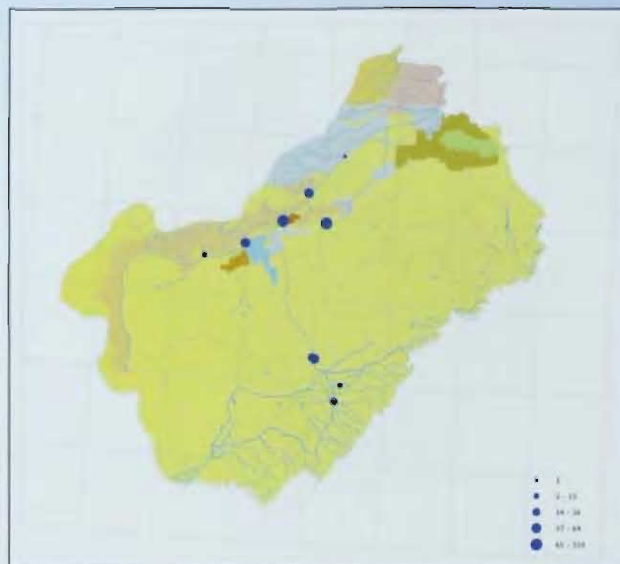


Diagnostics: domestic duck ~ 38–42 cm. O: *Male:* Head, neck and breast deep chestnut; nape darker; bill bluish-black; iris white; upper plumage blackish-brown; speculum white; belly with a large white oval patch; under tail-coverts white; legs dark slaty. *Female:* Duller with brownish iris and less contrasting off-white belly. *Male (in eclipse):* With brown mantle and dull reddish head, neck and breast. The deep chestnut colour; white oval belly-patch; white under tail-coverts and broad white crescent band on flight feathers are diagnostics of both sexes in flight. **Voice:** Harsh *kee-lee-lee*, silent away from breeding grounds. **Habitat:** Occurs in weedy and vegetation covered flets, open irrigation tanks, and reservoirs with thick marginal vegetation, coastal backwaters and lagoons. **Habits:** A shy and secretive duck, which occurs in pairs or in small groups, feeds mainly by diving at night, hides in reeds on being disturbed. In India, it breeds in Kashmir and Ladakh (around 1500 m) from May to June/July. **Food:** Aquatic vegetation (seeds, plants, algae) and animals (insects, larvae, fish). **Status and Distribution:** *Near threatened.* Common in north India; Pakistan; Nepal; Bhutan; Bangladesh; Sri Lanka; Maldives; breeds in C Asia to W China & W Mongolia, also in Kashmir and Ladakh in our limits; winters in S, E & SE Asia. **Remarks:** The main part of the population occurs in Asia, common in the Tibetan plateau. The estimated S, E and SE Asian population is 15,000. The number is declining rapidly due to wetland drainage and hunting all over the world.



55. *Aythya fuligula* (Linnaeus, 1758)

Tufted Pochard

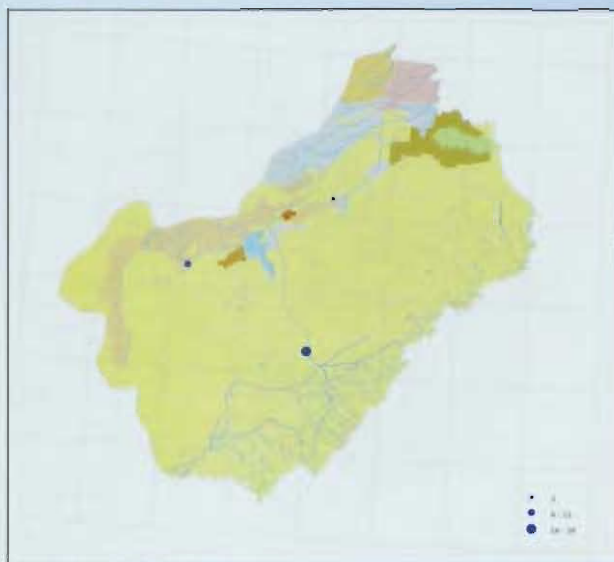
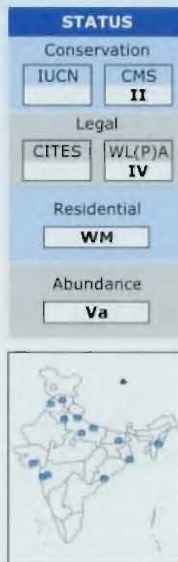
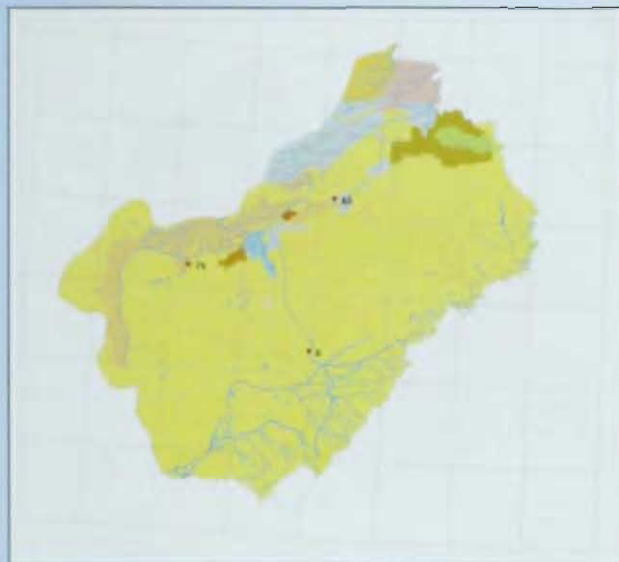


Diagnostics: domestic duck -; 40-47cm; C/H; **Male:** The only Pochard with a long occipital crest; and boldly contrasting black and white plumage. Head, neck, breast, back, tail and vent jet-black; sides of body and flanks pure white; belly greyish; iris golden-yellow; bill, legs and feet greyish-blue. **Female:** Dark brown with rudimentary occipital crest; belly white; often a white ring of feathers at base of bill. **Male (in eclipse):** Darker than female; flanks with white moulting; underparts uniformly brown; touch of white at base of bill. **Voice:** Silent. **Habitat:** Prefers open and deep tanks, irrigation reservoirs, lakes and marshes. **Habits:** Generally gregarious, occurs in large flocks of hundreds; a diving duck, feeds during daytime; arrives by mid-October and departs by end of March. **Food:** Predominantly aquatic animals such as molluscs, also plant seeds. **Status and Distribution:** Winter migrant, common all over India, occurring up to 5000m (Sikkim), but rare in Kashmir; Pakistan; Nepal; Bhutan; Bangladesh; Sri Lanka; Maldives. Breeds W & Central Siberia, winters in Central & S Asia. **Threshold number:** 10,000.



56. *Aythya marila* (Linnaeus, 1761)

Greater Scaup



Diagnostics: domestic duck-; 40-51cm; C/H; **Male:** Head, neck, breast; upper back, rump and upper tail-coverts black, the first two with green sheen. Back pale grey, tail blackish-brown; flanks and abdomen white, posterior abdomen mixed with brown, vent and under tail-coverts dark brown or black; iris golden-yellow; greyishblue bill with black tip; legs and feet greyish-blue. **Female:** Resembles the female Tufted Pochard, dark brown with a broad white ring around base of bill, and speculum white. **Male (in eclipse):** Like adult female, but with no white band round bill; upperparts more vermiculated with white and white speculum more pronounced than in female. **Voice:** Silent. **Habitat:** Occurs in coastal areas, and also large freshwater lakes and rivers. **Habits:** Gregarious in winter habitats; feeds by diving, move around freely in open water. **Food:** Aquatic molluscs and invertebrates constitute major food, also plant seeds. **Status and Distribution:** Rare winter migrant generally from Kashmir to Maharashtra and E India; Pakistan; Bangladesh. Breeds in E Siberia, winter in East and South Asia. **Threshold number:** 3,000



57. *Grus antigone* (Linnaeus, 1758)

Sarus Crane

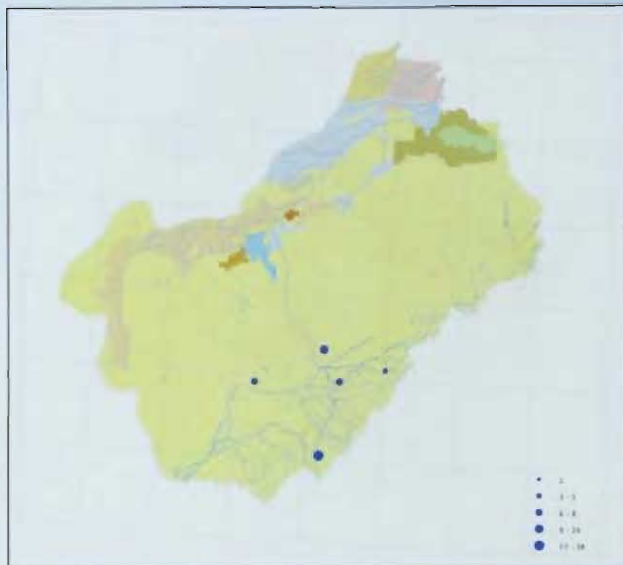


Photo: Gehan de Silva Weeraratne

Diagnostics: Vulture +; 156 cm; H/C; Adult: Sexes alike, female slightly smaller. The largest Indian Crane with naked red head and upper neck, grey plumage, greenish-horny bill, and red legs. **Juvenile:** Brownish-grey with rusty-brown on head and neck. **Voice:** Loud trumpeting. **Habitat:** The species frequents a variety of wetland habitats, cultivation and meadows. Due to the shrinkage of natural wetlands, the species has been forced into man-made wetlands. It is more able to utilise dry habitats than many other crane species. **Habits:** Generally keeps in pairs or small flocks, flocks upto 200 birds are not uncommon; also found in company with common crane. Sarus pair for life and the faithfulness and devotion of the couple is legendary in India. Courtship display very elaborate in breeding season; breeds from April to June and again from July to October; nests are usually in exposed positions in temporary or permanent shallow swamps or paddy fields, allowing a good view of the surroundings. **Food:** Omnivorous, seeds, grains and small fruit of various kinds, vegetable matter including shoots of grasses, the roots of aquatic plants and the pods of ground nuts *Arachis*, various cereals, potatoes, eggs of birds, crabs, amphibians (mainly frogs), and reptiles (Sundar and Choudhury 2004). **Status and Distribution:** Resident, nomadic and locally common in C and NW India, Uttar Pradesh, Gujarat, Rajasthan, Assam, north Andhra Pradesh; Pakistan; Nepal; Bangladesh; Myanmar; breeds in Pakistan, N India, Nepal and Myanmar.



58. *Grus virgo* (Linnaeus, 1758)

Demoiselle Crane



STATUS

Conservation

IUCN

CMS

II

Legal

CITES

II

WL(P)A

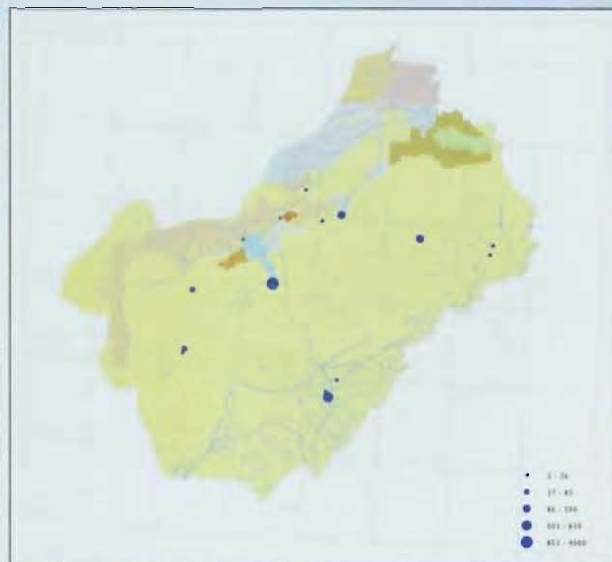
IV

Residential

WM

Abundance

LCom



Diagnostics: Sarus Crane-; 90-100 cm; H; *Adult:* Sexes alike. A delicate grey crane of medium size with black head and neck, except for grey forecrown and nape; prominent white ear-tufts behind eyes; black feathers of lower neck long, pointed and falling over breast; brownish-grey sickle-shaped secondaries drooping over tail; red-tipped greenish bill; black legs and feet. *Juvenile:* Like adult, but with grey head and much shorter drooping secondaries. **Voice:** Loud *kröök-kröök*, but softer than that of the Common Crane. **Habitat:** Large rivers with sandy beds, reservoirs, winter crop fields, flat open margins of jheels and tanks. **Habits:** Very highly gregarious species; flocks of thousands visit the subcontinent. Feeds in early morning and late afternoon in winter arable crop fields, retires on sandbanks or edges of jheels at night. **Food:** Seeds of wheat, gram and paddy are favoured. **Status and Distribution:** Winter migrant, locally common in Gujarat, Rajasthan, northern Karnataka, eastern Uttar Pradesh, Orissa and Andhra Pradesh; Pakistan; Nepal; Bhutan; Bangladesh. Breeds across W, Central Asia, winter in Indian sub-continent. **Threshold number:** 1,000.



Common Crane



STATUS

Conservation

IUCN	CMS
	II

Legal

CITES	WL(P/A)
II	IV

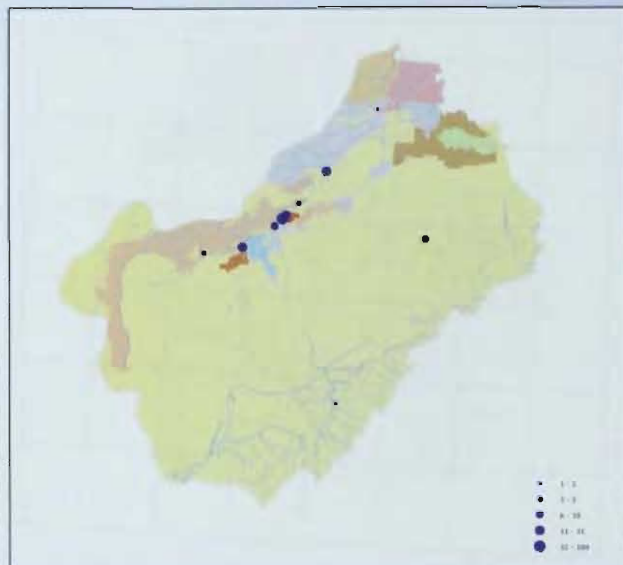
Residential

WM

Abundance

LCom



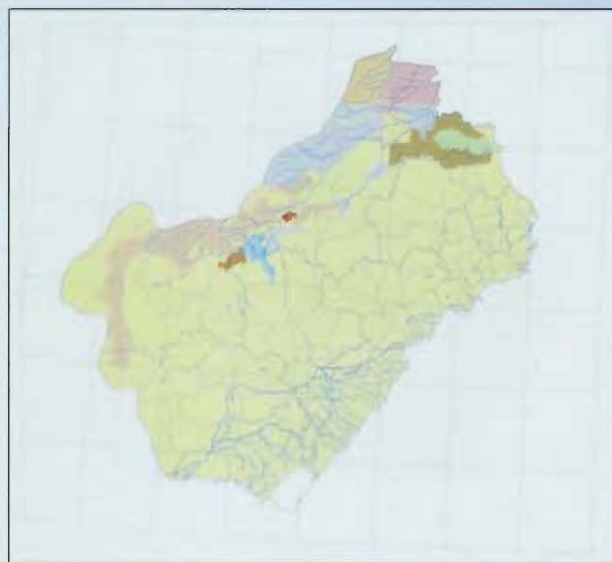
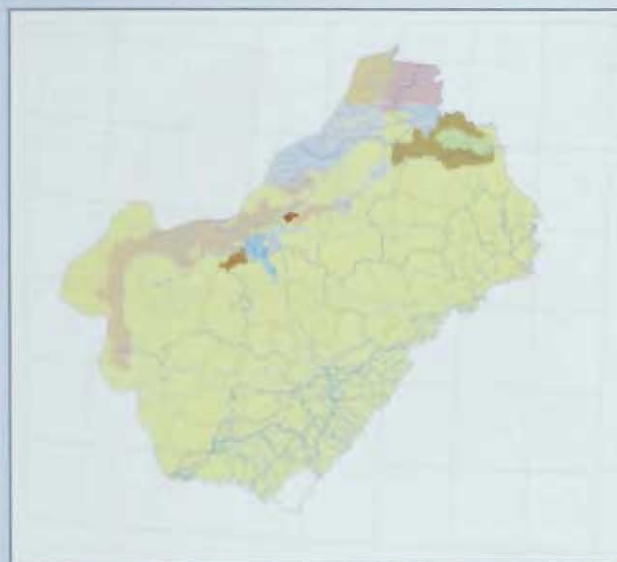


Diagnostics: Goose 110-120 cm; H/C; **Adult:** Sexes alike; a tall grey bird with black flight feathers, long neck, dull green bill, and black legs. Head and upper neck blackish with dull red naked patch across nape; a prominent broad white band runs from behind eye down on sides of upper neck; tall darker grey, concealed by a mass of long grey drooping tertaries. **Juvenile:** Grey with buff-edged feathers, crown and neck covered by rusty feathers, tertaries shorter. **Voice:** Echoing kraarrh. **Habitat:** Affect winter field crops, sandy riverbeds, marshes, reservoirs and jheels. **Habits:** Highly gregarious, sometimes keeps in large flocks of hundreds massed together on open sandbanks of rivers during winters, often in company of Demoiselle Crane. Fly in wide V-formation. Start arriving in NW India by August/September and return by end of March. **Food:** Mainly vegetarian, arable crops, shoots, tubers, seeds, also insects and reptiles. **Status and Distribution:** Winter migrant, earlier abundant in NW India, now generally occurs in Uttar Pradesh, Gujarat, Madhya Pradesh; Pakistan; Nepal; Bhutan; Bangladesh. Breeds in W Siberia & Kazakhstan, winter in W & C India, E Iran, Afghanistan. **Threshold number:** 700.



60. *Rallus aquaticus* Linnaeus, 1758

Water Rail

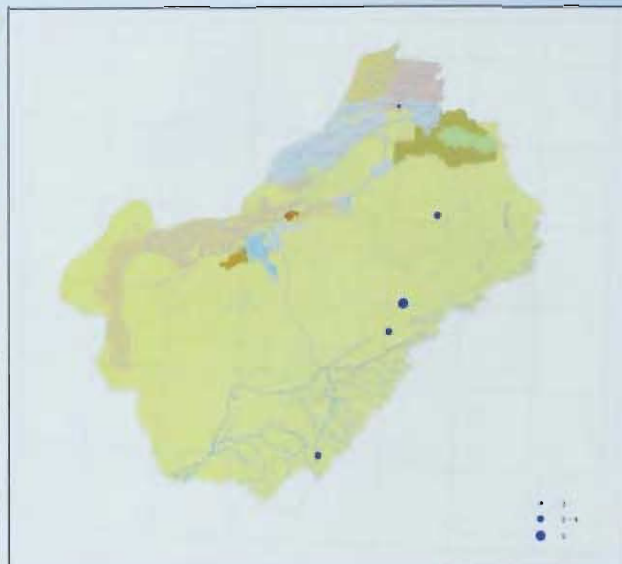


Diagnostics: Grey Partridge -; 23-28 cm; C/H; **Adult:** Sexes alike, medium-sized bird with slender body; comparatively longer, fleshy-brown legs and long orange-red bill. Above, greyish olive-brown streaked with black. Below, chin and throat white; sides of head, neck and breast pale slaty-grey; flanks with black and white bars. **Juvenile:** Has definite white bars on wing-coverts, reddish-edged feathers below. **Habitat:** Occurs in reedy marshes, jheels, inundated sugar and paddy fields, and mangroves. **Habits:** Normally occurs singly or in pairs in swampy reed beds, ventures out to feed during early morning or dusk in cloudy and drizzly weather. Breeds from late May to early August in Kashmir valley and nests well concealed in swamps a few centimeters above water. **Voice:** Squealing queek... krik. **Food:** Chiefly carnivorous, comprising snails, slugs, insects, but also marsh plants. **Status and Distribution:** Common in north-western and west-central India; straggles south up to Madhya Pradesh, breeds in Kashmir up to 1500 m; Pakistan; Nepal; Bangladesh; Sri Lanka. Breeds in W and C Asia, winter in NW & NE India and E China.



61. *Amaurornis phoenicurus* (Pennant, 1769)

White-breasted Waterhen

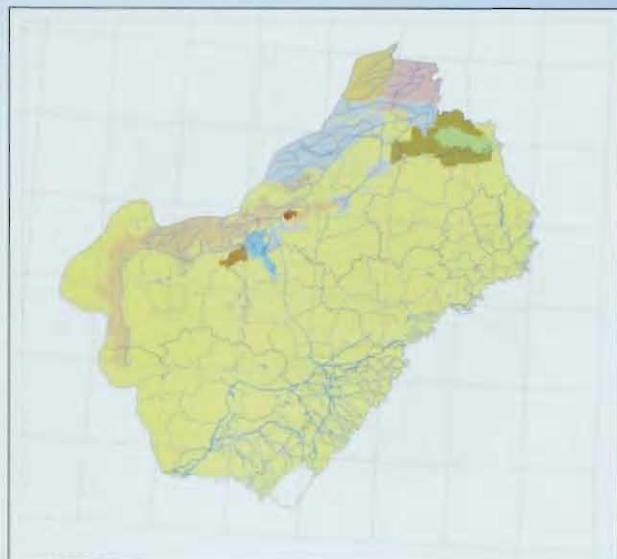
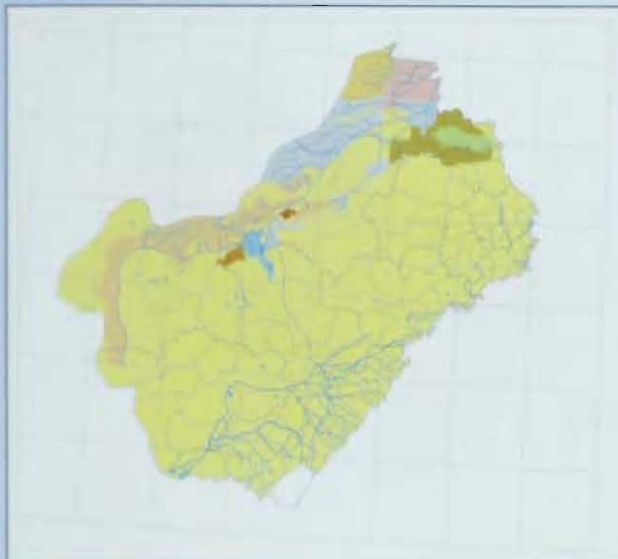


Diagnostics: Grey Partridge \pm ; 32 cm; O; *Adult:* Sexes alike. A familiar dark slaty-grey and silky-white rail with greenish-yellow bill, base of upper mandible red; forehead, supercilia and sides of head pure white; upperparts dark slaty-grey; under parts silky-white, except rufous vent and under tail-coverts; suede of breast and flanks slaty-grey; legs and feet yellowish-green. *Juvenile:* More olive-brown above with white facial mask obscured by slaty-tipped feathers. **Habitat:** Occurs in reedy marshes, edges of submersed fields, monsoon ponds, roadside ditches, village tanks, and reservoirs. **Habits:** Most common rail, less shy and secretive, often seen in villages and parks within the city limits, often feed in dry land, breeds from June-July to October, and nests on the ground or thick bushes at water edges. **Voice:** Very silent except during breeding season in monsoon, call *krr-kwaak-kwaak*. **Food:** Almost omnivorous, including insects, molluscs, worms and plant shoots and seeds. **Status and Distribution:** Resident almost throughout India up to 1500 m.; Andaman & Nicobar Island; Pakistan; Nepal; Bhutan; Bangladesh; Sri Lanka; Maldives; extend upto E China and SE Asia, Malaysia and Philippines.



62. *Gallicrex cinerea* (Gmelin, 1789)

Watercock

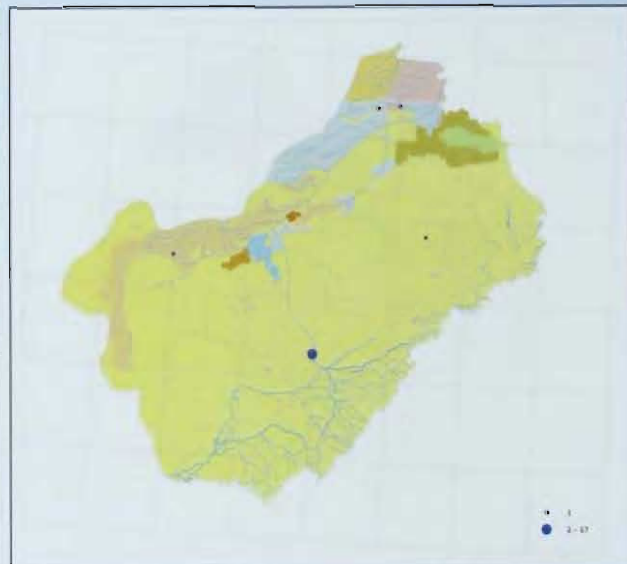


Diagnostics: Grey Partridge +; 43 cm; H/C; **Adult:** Sexes alike in non-breeding plumage, female considerably smaller. Dark brown above and pale buffy brown with fine wavy darker bars below; bill horny-yellow; legs and feet dull greenish-brown. The breeding male black with grey scaly markings above; red fleshy frontal shield projecting above crown; bright red eyes and legs; buff-white under tail-coverts. **Juvenile:** Like female but less barred below. **Habitat:** Affects reedy swamps, low-lying waterlogged paddy and other fields, ditches, ponds, canals and channels with emergent vegetation. **Habits:** Crepuscular, feeds early morning or late evening, as also in cloudy weather; male belligerent during breeding season, which extends from June to September. **Voice:** kok kok...; utumb utumb...; kluck kluck...; toom. **Food:** Chiefly vegetarian, comprising arable crops, wild rice, also aquatic insects and molluscs. **Status and Distribution:** Resident and widespread species in well-watered areas, disperses widely in SW monsoon; generally common in NE India; Pakistan; Nepal; Bangladesh; Sri Lanka; Maldives. SE Asia.



63. *Porphyrio porphyrio* (Linnaeus, 1758)

Purple Moorhen

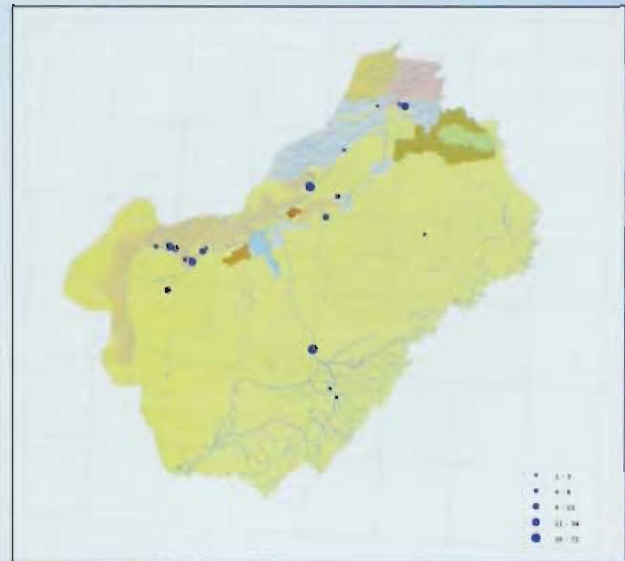


Diagnostics: Hen \pm ; 45-50 cm; H/C; *Adult:* Sexes alike, but the bald red forehead (Basque) smaller than in female; purplish-blue rail with red bill, frontal shield and legs. Upperparts generally purple-blue; tail black with green reflections; scapulars and wings greenish-blue; chin, throat and foreneck cobalt blue; breast greenish-blue; abdomen and flanks purple; vent blackish-brown; under tail-coverts white. *Juvenile:* Paler, with black bill and Basque; orange-brown legs and feet. **Habitat:** Occurs in large marshes and reed beds around jheels, rivers and swamps. **Habits:** Diurnal species occurs in flocks of 5-10, though bigger groups up to 50; climbs among reeds for feeding; breeds mainly during SW monsoon, from June to September. **Voice:** explosive cooah (alarm call), powerful quinquinkrrrr... (song), soft chuck-chuck (contact call), etc. **Food:** Chiefly vegetarian (seeds and grains), also molluscs and insects. **Status and Distribution:** Resident and common throughout India up to 1500 m, except in NW and NE Himalaya, rare in Kashmir, uncommon elsewhere; Nepal; Pakistan; Bangladesh; Sri Lanka; N Myanmar; extends upto SW China and N Thailand.



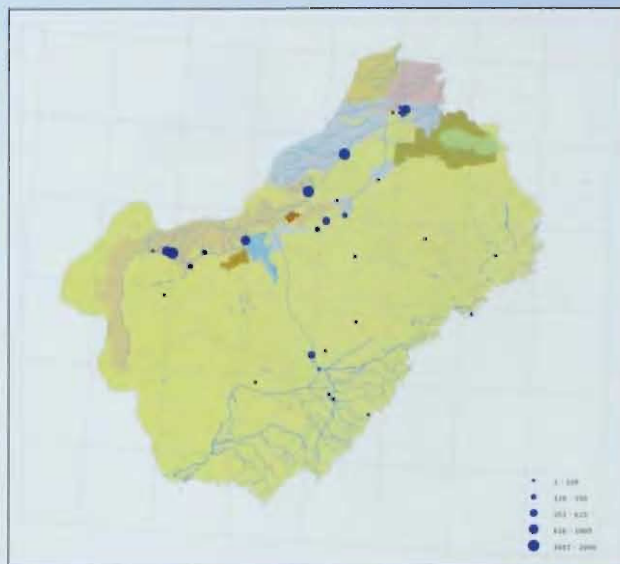
64. *Gallinula chloropus* (Linnaeus, 1758)

Common Moorhen



65. *Fulica atra* Linnaeus, 1758

Common Coot

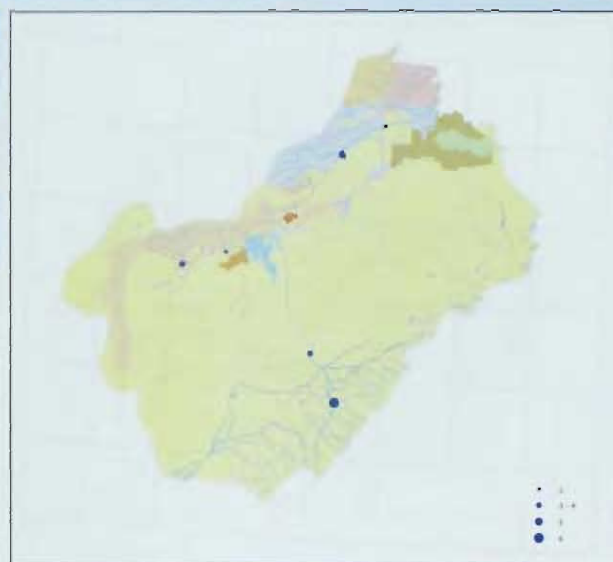


Diagnostics: Duck -; 36-38 cm; H/C; **Adult:** Sexes alike. A slaty-black waterbird with stout pointed ivory-white bill, white frontal shield and green legs; head, neck and throat black; upper plumage slaty-black with steel-blue sheen; under plumage slaty-grey with dark vent and under tail-coverts. **Juvenile:** Greenish-brown above and mottled white underneath. **Habitat:** Large jheels, lakes, reservoirs and irrigation tanks with deep water and marginal emergent vegetation. **Habits:** Gregarious, gathers in very large flocks during winter, diurnal, forages on aquatic vegetation in open waters, spends major part of day amidst floating vegetation. Breeds from May to December vary locally. **Voice:** Varied and loud high-pitched pyee and a series of long, often soft dp...dp...calls. **Food:** Chiefly vegetarian (aquatic plants, shoots, seeds), also molluscs and aquatic insects. **Status and Distribution:** Common resident and winter migrant and widely distributed all over India, breeds up to 2500 m in Himalaya in India and Central and S Asia; Pakistan; Nepal; Bangladesh; Sri Lanka. **Threshold number:** 15,000.

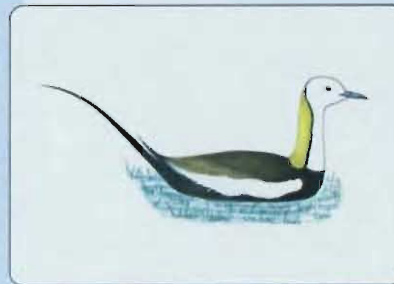


66. *Hydrophasianus chirurgus* (Scpoli, 1786)

Pheasant-tailed Jacana

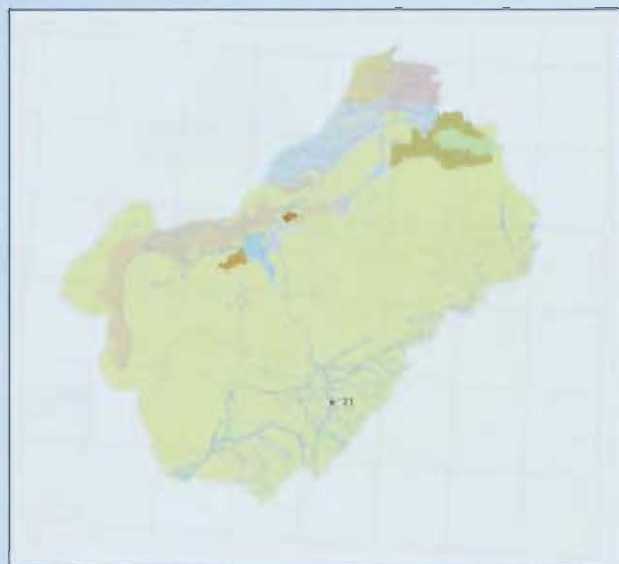


Diagnostics: Grey Partridge =; 39-58 cm; H/C; **Adult:** Sexes alike, female slightly larger. **Breeding:** Head, face, throat and foreneck white; hind neck pale silky golden-yellow, edged with black line; upper and lower plumage chocolate-brown; rump, upper tail-coverts and tail black; wing-coverts white; tail long, pointed and sickle-shaped (Pheasant-like); legs and feet pale bluish with long spidery toes. **Non-breeding:** Chiefly dull brown and white with a black "necklace" on upper breast, and without the long tail. **Juvenile:** Yellow on neck absent; black necklace broken up with white; and crown dull rufous-brown. **Habitat:** Occurs in lotus and water hyacinth covered wheels, reservoirs, lakes, pools and village tanks. **Habits:** Gregarious in non-breeding season, when flocks of 50 to 100 birds occur, feeds in open amidst the floating vegetation on which the bird walks; breeds from May to July in Kashmir and up to September in N India. **Voice:** loud musical me-e-ou in breeding season. **Food:** Chiefly vegetarian (aquatic plants, shoots, seeds), also molluscs, aquatic insects. **Status and Distribution:** Resident, widely distributed all over India, mainly summer visitor up to 1500 m in Himalaya for breeding, winter migrant to plains of Indian peninsula; Pakistan; Nepal; Bangladesh; Sri Lanka. SE Asia. **Threshold number:** 1,000.



67. *Metopidius indicus* (Latham, 1790)

Bronze-winged Jacana



STATUS	
Conservation	
IUCN	CMS
Legal	
CITES	WL(P)A IV
Residential	
R	
Abundance	
LCom	

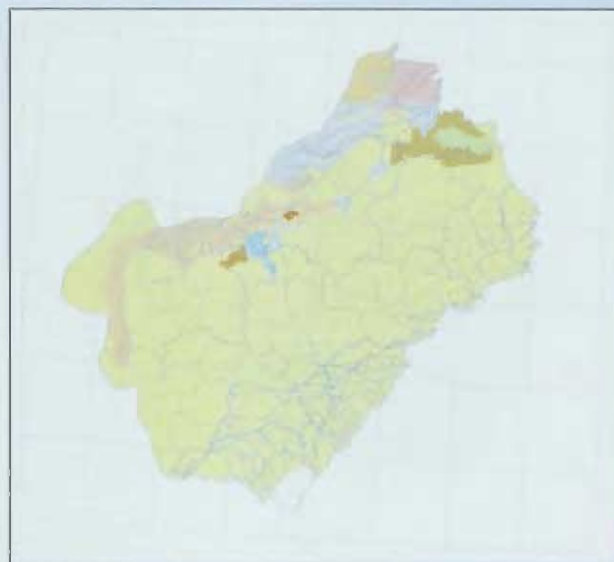


Diagnostics: Grey Partridge +; 28-31cm; H/C Adult: Sexes alike, female slightly larger. Bill greenish-yellow, tinged with red at base; frontal shield bluish-red; a broad supercilary streak from eye to nape pure white; rest of head, neck and lower parts black with deep green sheen; back and wings metallic greenish-bronze; tail and under tail-coverts chestnut; vent and thigh-coverts dull brownish-black; legs and feet dull green. **Juvenile:** With short dull white supercilium, rufous-brown crown, terminal black band on rufous tail, and whitish underbody. **Habitat:** Occurs in vegetation covered jheels, lakes, reservoirs, pools and village tanks. **Habits:** Similar to Pheasant-tailed Jacana and generally found together; when disturbed partially submerge, on being constantly disturbed takes refuges in standing vegetation on dry land; breeds from June to September in N India. **Voice:** Short, harsh grunt. **Food:** Mainly vegetarian (seeds, shoots) also aquatic insects, molluscs. **Status and Distribution:** Resident, widely and commonly distributed in western and southern India, mainly from Uttar Pradesh and Gujarat; Pakistan; Nepal; Bangladesh. SE Asia.



68. *Haematopus ostralegus* Linnaeus, 1758

Eurasian Oystercatcher



STATUS

Conservation

IUCN

CMS

Legal

CITES

WL(P)A

IV

Residential

WM

Abundance

Rare



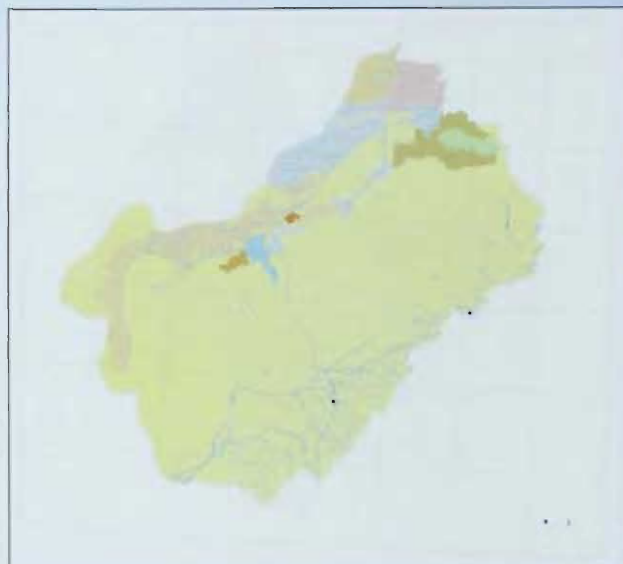
Photo: Gehan de Silva Wijeyeratne

Diagnostics: Grey Partridge +; 42-46 cm; C; Sexes alike; a striking black and white bird with stout red legs; long straight orange-red snipe-like bill, blunt at tip. **Non-breeding** (first winter): white-collar present on foreneck; can be distinguished in flight by broad white band across the black wings. **Habitat:** Chiefly a coastal bird, affects sandy and rocky seashores, rare inland on shingle beds of large rivers. **Habits:** Occurs in scattered flocks on seashore with other waders, runs about on intertidal sand, in search of food. **Voice:** A loud piping *pl-peep*. **Food:** Carnivorous, mainly marine molluscs, annelids and crustaceans. **Status and Distribution:** Winter migrant chiefly to seacoasts and offshore islands, a rare passage migrant inland; Sri Lanka; Maldives; Bangladesh; Nepal; Pakistan. Breeds in W Siberia and C Asia, winter in Coastal NE Africa, Persian, and Arabian Gulf E to NW India. **Threshold number:** 15,00.



69. *Pluvialis fulva* (Gmelin, 1789)

Pacific Golden-Plover



Diagnostics: Grey Partridge -: c 24 cm; C/H; Sexes alike; similar to Golden Plover, but with less gold spangling, especially on wings. **Non-breeding** (winter): Upperparts mottled brown, white, and golden yellow; underparts whitish, breast mottled with brown, grey, and yellow. Differs from the preceding two plovers by a little duller upperparts and grey axillaries (under wings near body), which are pure white in Golden Plover and black in Grey Plover. **Breeding** (summer): Forehead white running back in a broad band over the eyes and down sides of neck and breast; lores black; remaining upperparts blackish brown spangled with white and golden- yellow; underparts from throat to vent black. **Habitat:** Wet Grasslands, coasts and coastal lagoons, tidal mudflats, muddy banks of rivers and Jheels. **Habits:** Gregarious, in scattered flocks of 20-50 birds in company of other waders; very wary, when disturbed, the flock flies away suddenly. **Voice:** abrupt high-pitched disyllabic. **Food:** Chiefly carnivorous (insects, small molluscs and crustaceans), occasionally seeds of marshy plants. **Status and Distribution:** Widespread winter migrant to NE and SE India, vagrant elsewhere; arrives early in August; Pakistan; Nepal; Bangladesh; Sri Lanka; Maldives. Breeds in N Asia up to Yenisey River, winter chiefly in SW, S Asia & E Africa. **Threshold number:** 750.



70. *Pluvialis squatarola* (Linnaeus, 1758)

Grey Plover



STATUS

Conservation

IUCN

CMS

II

Legal

CITES

WL(P)A

IV

Residential

WM

Abundance

UnCom

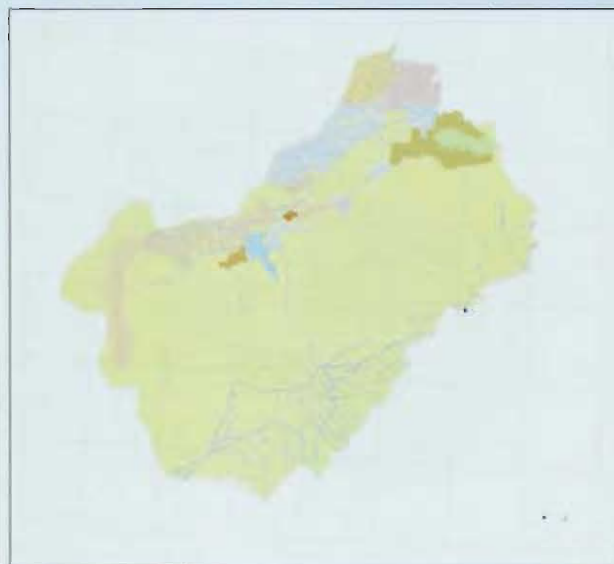
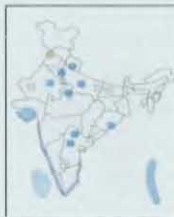


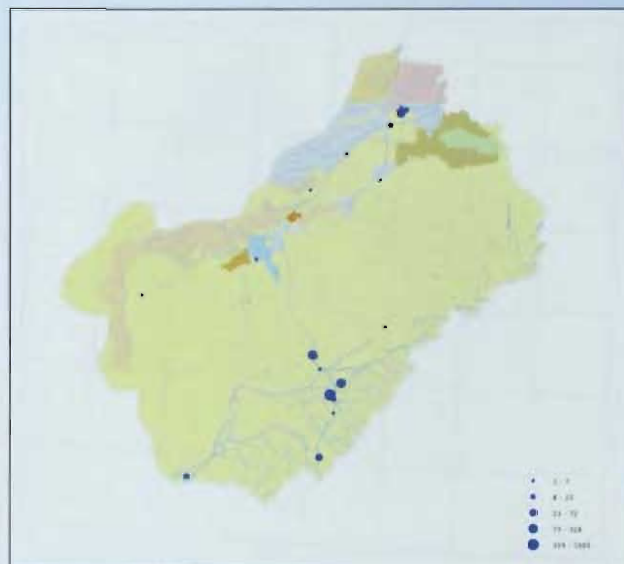
Photo: John Holmes

Diagnostics: Grey Partridge =; 27-30 cm; C; Sexes alike. **Non-breeding (winter):** Forehead and lores white speckled with black; sides of head and neck white streaked with brown; rump, uppertail-coverts and tail white narrowly barred with brown; remaining upperparts dark brown, conspicuously scalloped with pale brownish-grey. Foreneck, breast and flanks streaked and spotted with brown; remaining underparts white. **Breeding (summer):** Upperparts mottled black and silver-grey; chin to middle of abdomen black; lower abdomen and under tail-coverts white. In flight a large black oval patch (axillaries) conspicuous in both summer and winter. **Habitat:** Mainly seaboard, coastal, in intertidal zones, less common (only as vagrant) in inland waters, lakes and pools. **Habits:** Gregarious, generally in flocks of 15-20, but sometimes very large flock(s) seen, swift flier, very wary and thus difficult to approach, occurs in company of other waders. Arrives in NW India by early August and departs by April, though rare vagrants may be seen round the year. **Voice:** Shriil chée-woo-ée. **Food:** Carnivorous (molluscs, crustaceans, insects), rarely seeds of marsh plants. **Status and Distribution:** A wide spread winter migrant to coastal India, rarely inland as passage migrant, common in peninsula; Pakistan; Nepal; Bangladesh; Sri Lanka; Maldives. Breeds in Arctic Russia, winter in S Asia. **Threshold number:** 300.



71. *Charadrius dubius* Scopoli, 1786

Little Ringed Plover

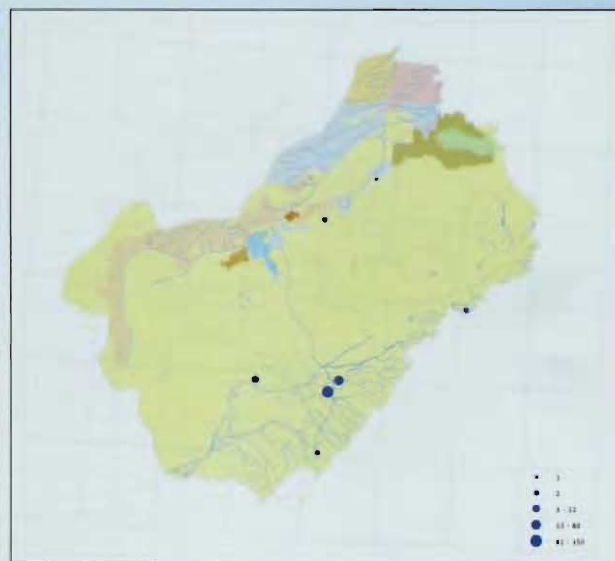
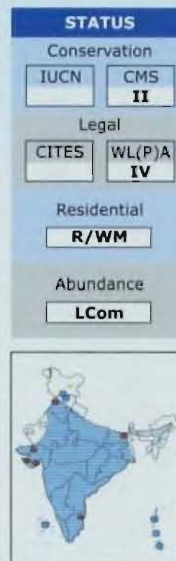


Diagnostics: Lesser Sand Plover \pm ; 14-17 cm; C; **Adult:** Sexes alike. A typical little plover with sandy brown upperparts and white forehead; black fore-crown, separated from sandy brown crown by a thin white line running back over eyes and ear-coverts; black bands on head and breast, the latter continues into a pectoral band; white neck-ring, chin, throat and under parts; yellow eye-ring and legs; a double collar on hind neck (the upper white, the lower black) separating crown from the sandy brown upperparts. **Juvenile:** Brownish head and breast; whitish fringes on black pectoral band when first assumed. **Habitat:** Sandy, pebbled margins of lakes, rivers, pools, mudflats, grasslands, intertidal zones, tidal creeks, etc. **Habits:** In pairs or small flocks, which scatter over wide area for feeding, generally mixed with other waders. **Voice:** Plaintive short and single *phew*. **Food:** Carnivorous, insects, worms and tiny crabs. **Status and Distribution:** Partly resident (breeds in Kashmir up to 1500 m) and partly winter migrant to the rest of the country, common and widespread; Pakistan; Nepal; Bhutan, Bangladesh, Sri Lanka and Maldives. Chiefly breeds in Siberia, N, E & S China, Indian subcontinent, Sri Lanka & SE Asia; winter in S & SE Asia, S China. **Threshold number:** 1,000.



72. *Charadrius alexandrinus* Linnaeus, 1758

Kentish Plover



STATUS

Conservation

IUCN

CMS

II

Legal

CITES

WL(P)A

IV

Residential

R/WM

Abundance

LCom

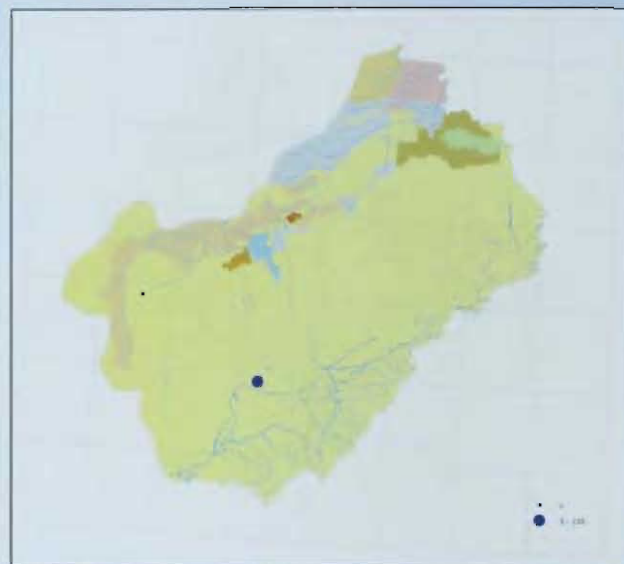
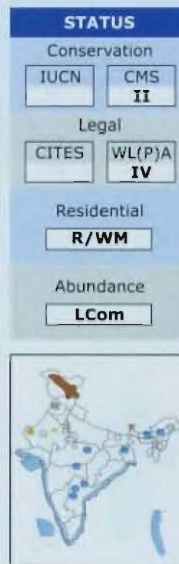


Diagnostics: Grey Quail - 15-17 cm; C; *Adult*: Sexes alike, but female duller; similar to immature Little Ringed Plover. *Non-breeding* (winter): Distinguished by blackish legs, white forehead continued unbroken as supercilium, sandy grey crown, narrow and brownish eye stripe, and a small dark patch on either side of breast. *Breeding* (summer): Male has black and rufous crown and black eye streak; female more or less as in non-breeding plumage. *Juvenile*: Like female but with the upperparts narrowly scalloped with sandy buff. **Habitat:** Mainly seashore, also riverbeds with shingle, sandy margins of lakes ponds, and salt pans. **Habits:** Flocks mixed with other waders, keeps in pairs or small groups, which scatter over large areas for feeding; breeds from March to August in W (Sind & Gujarat) and S (Tamil Nadu); nests slight depression on seashore, saltpan and dry riverbeds. **Voice:** Soft *peep*, short *kirrik*, shrill *zoo-a*. **Food:** Carnivorous (crabs, sand hoppers and other insects). **Status and Distribution:** Resident and widespread winter visitor, locally common, India; Pakistan; Nepal; Bhutan; Bangladesh; Sri Lanka; Maldives. Breeds across C Asia; winter in S Asia. **Threshold number:** 1,000.



73. *Charadrius mongolus* Pallas, 1776

Lesser Sand Plover

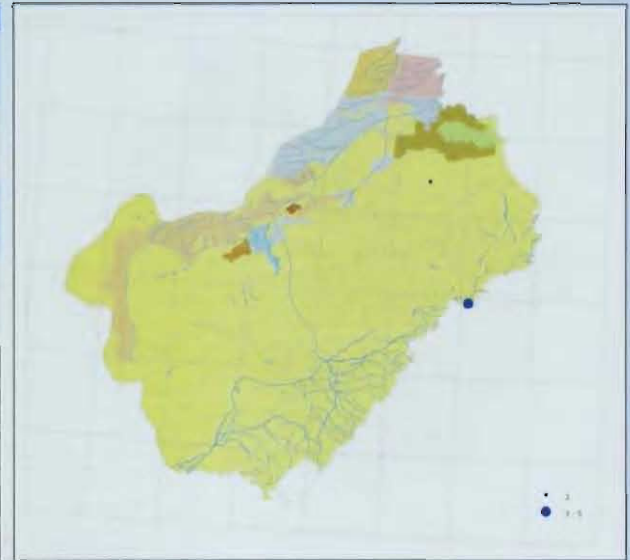


Diagnostics: Grey Quail =; 19-21 cm; C; *Adult:* Sexes alike; a typical little plover with short pigeon-like black bill and greenish-grey legs. *Non-breeding* (winter): Distinguished from similar Kentish Plover by broad white face divided by dark brownish patch behind eyes. Upperparts sandy greyish-brown and underparts white. *Breeding* (summer): *Male:* Forehead and sides of head black; crown and hind neck rusty; remaining upperparts sandy brown; upperparts and flanks chestnut, separated from glistening white throat by a blackish half-collar; rufous-orange breast and hind neck. *Female:* Similar to non-breeding adult but with pale orange breast-band. *Juvenile:* Feathers of upperparts with pale fringes. **Habitat:** Occurs in sandy plains in the vicinity of high-altitude lakes, streams and marshes in summer; during winters on coasts, intertidal mudflats, tidal creeks, rocky & sandy shores. **Habits:** Gregarious, keeps in scattered flocks, which are sometimes very large, with other waders; when resting the bird stands inert on one leg; breeds from early June to mid-July in Ladakh. **Voice:** Sharp and short *chituk*, *chi-chi*, and *kruit-kruit*. **Food:** Carnivorous, comprising crabs, insects and worms. **Status and Distribution:** Resident between 3900-5500 m in Ladakh, Lahaul-Spiti and Sikkim, common winter migrant to coastal areas, rare inland; Pakistan; Nepal; Bangladesh; Sri Lanka; Maldives; C Asia; Himalaya; S Tibet. **Threshold number:** 1400.



74. *Charadrius leschenaultii* Lesson, 1826

Greater Sand Plover

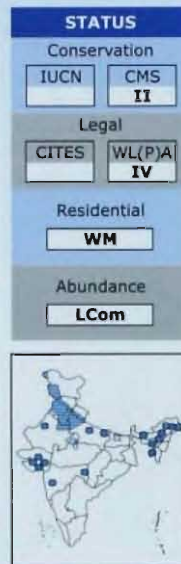


Diagnostics: Grey Partridge -; 22-25 cm; C; Sexes alike; *Non-breeding* (winter): Forehead and supercilium prominent pale; crown, ear-coverts, upperparts and patches on sides of breast grey-brown. *Breeding* (summer): Male has black mask with white patch on sides of forehead, rufous-orange breast-band and sides of neck; while female is similar to non-breeding adult but with an orange breast-band. **Habitat:** Mainly on sandy shores, intertidal mudflats, salt pans, mangroves and rocky coasts. **Habits:** A sea-board species, gregarious in company with other waders in the coastal areas. **Voice:** A sharp *trrrt* or *prrrrt*. **Food:** Carnivorous, comprising crabs, marine worms and insects. **Status and Distribution:** Winter migrant to Indian seaboard; Pakistan; Nepal; Bangladesh; Sri Lanka and Maldives. Breeds in C Asia, winter in Coastal S Asia. **Threshold number:** 1,000.



75. *Vanellus vanellus* (Linnaeus, 1758)

Northern Lapwing

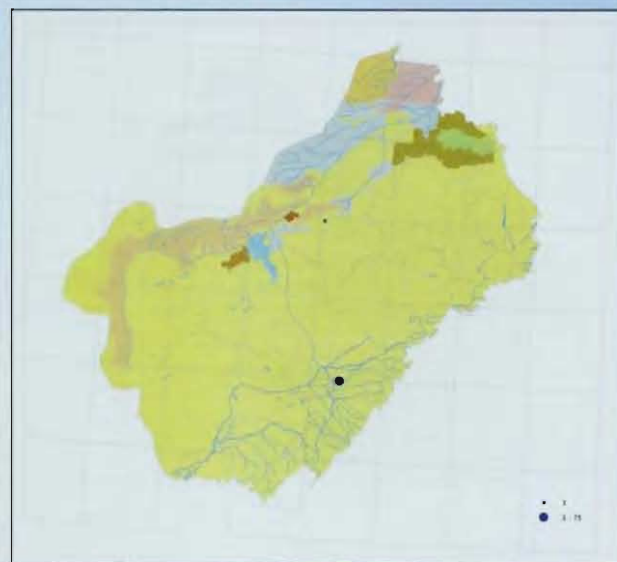
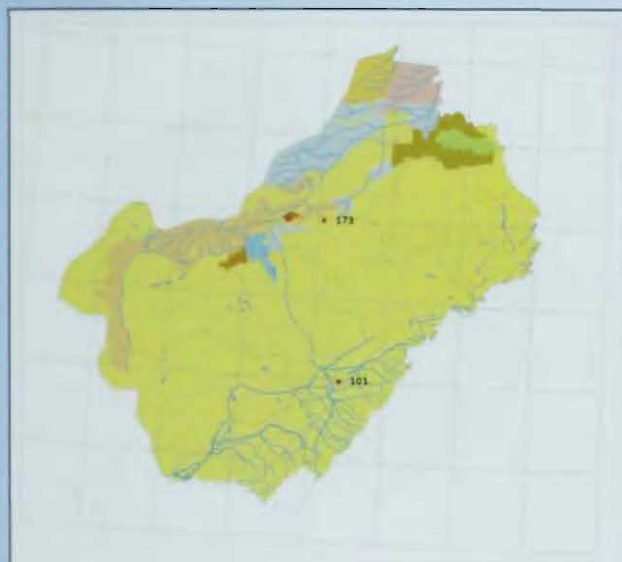


Diagnostics: Grey Partridge =; 28-31 cm; C; *Adult:* Sexes alike, female's crest smaller. *Non-Breeding* (winter): Crown brown; face, chin, throat and foreneck white, speckled with brown or black; scapulars, innermost secondaries and black breast-feathers fulvous scalloped; remaining underparts as in breeding bird. *Breeding* (summer): Long upstanding pointed crest, crown and chin to breast black; remaining underparts white; sides of head and neck white with black markings; back, rump, scapulars and innermost secondaries glossy bronze-green; scapulars marked with violet-purple; upper and under tail-coverts cinnamon, former with a broad black subapical band. *Juvenile:* Brown above, each feather fulvous edged; back slightly glossed with purple-bronze and wings with green; under-parts like non-breeding adult. **Habitat:** Affects fallows, reaped and irrigated fields, and riverbanks with pebbles, lake margins and marshlands. **Habits:** Generally found in pairs or small groups, though congregates in large flocks before migration, forage on wet meadows. **Voice:** Normally silent in winter; plaintive pee-wit. **Food:** Carnivorous (molluscs, insects and worms). **Status and Distribution:** Winter migrant, locally common in N and NW, rare in NE India; Assam, Manipur, Arunachal Pradesh; Pakistan; Nepal; Bhutan; Bangladesh. Breeds in C Asia, winter in S Asia. **Threshold number:** 250.



76. *Vanellus malabaricus* (Boddaert, 1783)

Yellow-wattled Lapwing

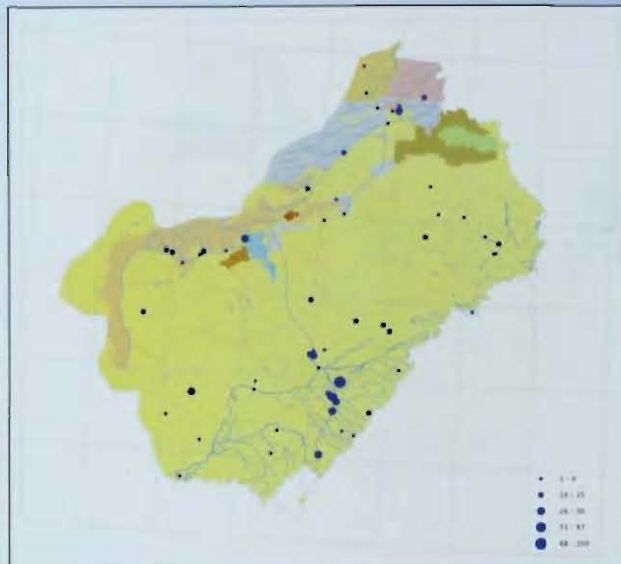


Diagnostics: Grey Partridge -; 26-28 cm; C; *Adult:* Sexes alike. Bill black with yellow base and gape; wattle bright yellow; crown (skull cap) silky black, surrounded by a thin white line; upperparts sandy brown. Tail white with a broad black sub terminal band; chin and throat black; breast sandy brown; remaining underparts white separated from breast by a thin black line; primaries black; outer secondaries white with a black tip; legs and feet bright yellow. *Juvenile:* Pale sandy brown above and whitish below with traces of brown on throat and upper breast. **Habitat:** Fallows, dry fields, much less dependent on water, near jheels, keeps away from muddy shores. **Habits:** Very similar to Redwattled Lapwing except that it keeps away from water, occurs in pairs, breeds March to August, nests on dry and bare ground **Voice:** Plaintive screaming tyi-ee, twit-twit-twit. **Food:** Chiefly insectivorous (grasshoppers, beetles, etc.). **Status and Distribution:** Resident, Biome Restricted Species, locally common and widespread in India, undertakes local seasonal movements during SW monsoon, endemic to subcontinent; Pakistan; Nepal; Bangladesh; Sri Lanka.



77. *Vanellus indicus* (Boddaert, 1783)

Red-wattled Lapwing



Diagnostics: Grey Partridge +; 32-35 cm; C; Adult: Sexes alike; a familiar plover with black tipped red bill, crimson-red wattle and eyelids, and bright yellow legs. Head, neck and breast jet-black; upperparts bronze-brown; underparts white continuing to broad bands up the neck-sides towards eyes; rump, upper tail-coverts and tail white, the last with a broad sub-terminal black band; primaries and outer secondaries black, the latter with broad white bases. **Juvenile:** Black feathers of head broadly fringed with brown; chin, throat and fore-neck white; sides of neck sullied white. **Habitat:** Found at jheels, tanks, ditches, puddles, open cultivation, countryside and open grounds near water. **Habits:** Generally crepuscular and nocturnal; feeds actively in morning; evening or moonlit nights; keeps in pair or threes or small flocks up to a dozen birds; breeds from March to August-September in India; nests on ground in natural depressions, sometimes also at unusual places like rooftops, railway tracts, etc. **Voice:** Loud penetrating *did ye do it*. **Food:** Carnivorous (molluscs, insects), rarely vegetable matter. **Status and Distribution:** A common and widespread resident species all over India; undertakes altitudinal migration in spring and autumn up to 1800m; Pakistan; Nepal; Bhutan; Bangladesh; Sri Lanka; Myanmar; extends to N Malaysia & Vietnam.



78. *Vanellus gregarius* (Pallas, 1771)

Sociable Lapwing

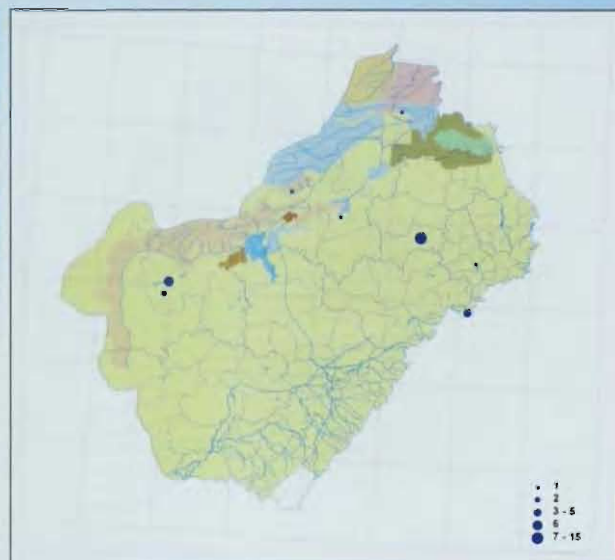


Photo: Marten van Dijk

Diagnostics: Grey Partridge \pm ; 27-30 cm; H; **Adult:** Sexes alike, **Non-Breeding** (winter): Crown and eye-stripe brown, forehead buffy-white, lower back white; tail white with a black subterminal band, Chin and throat white; breast mottled brown and grey; remaining underparts smoky-white; Bill, legs and feet black. **Habitat:** Occurs in fallow, wastelands, stubble, occasionally grassy margins of lakes and rivers. **Habits:** Generally keeps in small flocks of 5 or 6, feeds generally during night, early morning or evening. **Voice:** Usually silent. **Food:** Insectivorous (grasshoppers, crickets). **Status and Distribution:** Globally threatened/Critical. Rare winter migrant to N and NW India, though common earlier; Pakistan; Bangladesh; Sri Lanka; Maldives; breeds in SC Asia, winter in NE Africa to Sudan and NW India. **Remarks:** In India, the species was a common winter visitor to areas of the Punjab. Nineteenth-century reports from Kachchh, Gujarat, suggested that it was "very common in open country". Numbers have dropped dramatically and the species is encountered at very few sites. **Threats:** Open areas and fallow land favoured by the species are disappearing, and grassland is becoming covered by exotic *Prosopis juliflora* trees. Dry areas of Gujarat, Haryana and Rajasthan are disappearing under cultivation, and this might be a factor underlying a decline, although the species is often seen in cultivated areas. Protection of short-cropped dry land habitats may be needed (BirdLife Int., 2001). **Threshold number:** 2.



79. *Vanellus leucurus* (Liechtenstein, 1823)

White-tailed Lapwing

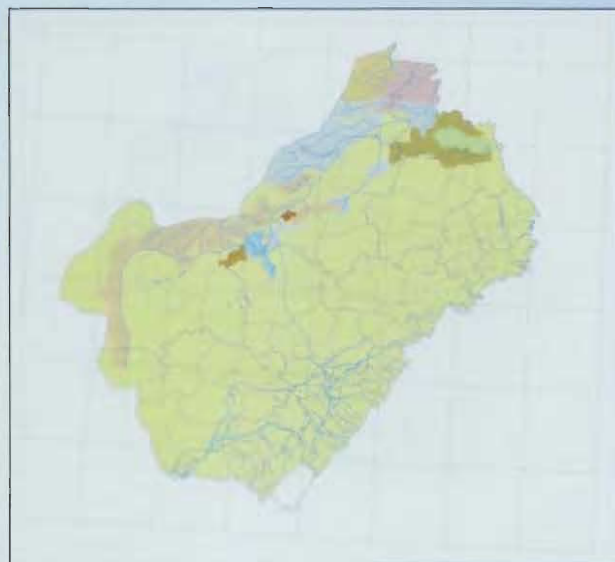
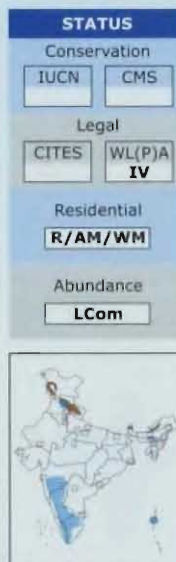
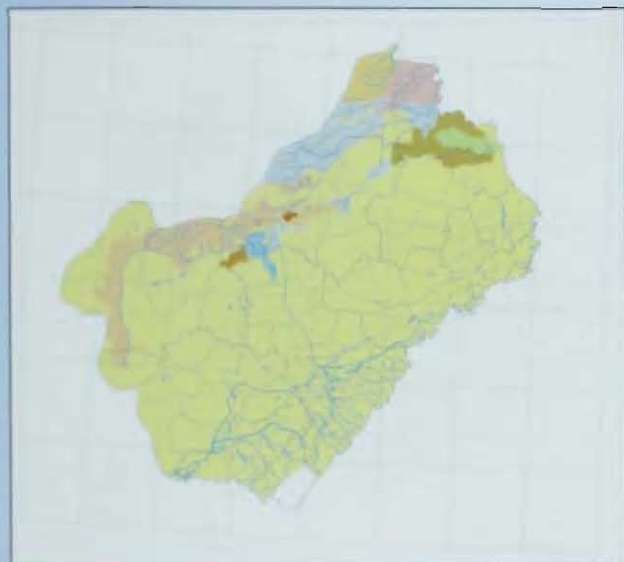


Diagnostics: Grey Partridge \pm ; 26-29 cm; C; *Adult*: Sexes alike. A light brown and white Plover with black bill and long prominent yellow legs; forehead and indistinct supercilia greyish-white; upper plumage light brown, except white rump and tail; chin, throat and foreneck ashy-grey; breast dark grey; abdomen and under tail-coverts rosy-white. The white rump and tail, and contrasting black primaries and white patch on secondaries are diagnostics in flight. *Juvenile*: darker above and sullied white below. **Habitat:** Freshwater marshes and marshy grassy edges of lakes and jheels. **Habits:** Gregarious, occurs in large flocks when migrating, otherwise in smaller groups of up to 25 birds, feeds in shallow water also on land. Visits N and NW India from September to March. **Voice:** Usually silent in winter, soft whistle *chee-viz, pi-wick*. **Food:** Carnivorous comprising aquatic insects, crustaceans, molluscs, etc. **Status and Distribution:** Locally common winter migrant to N, NW and C India; Pakistan; Nepal; Bangladesh. Breeds in Central Asian Republics, winter in C & E Pakistan, NC & NW India. **Threshold number:** 1,000.



80. *Scolopax rusticola* Linnaeus, 1758

Eurasian Woodcock



Diagnostics: Partridge -; 33-35 cm; C/H; Sexes alike. An outsized snipe with cryptic colours of brown, black and white; bill long, dusky with swollen tip; head and nape with three broad transverse bands of velvet-black, divided by yellowish lines; a blackish line running from base of bill to eye; another similar line below eye and posterior ear-coverts; remaining face grey with brown spots. Hind crown, nape and rump cross-banded black and rufous; remaining upperparts brownish-grey blotched and barred with black, rufous and buff. Chin white; remaining underparts dull greyish-white, cross-banded throughout with dark brown, more numerous on upper breast; legs short, green-grey.

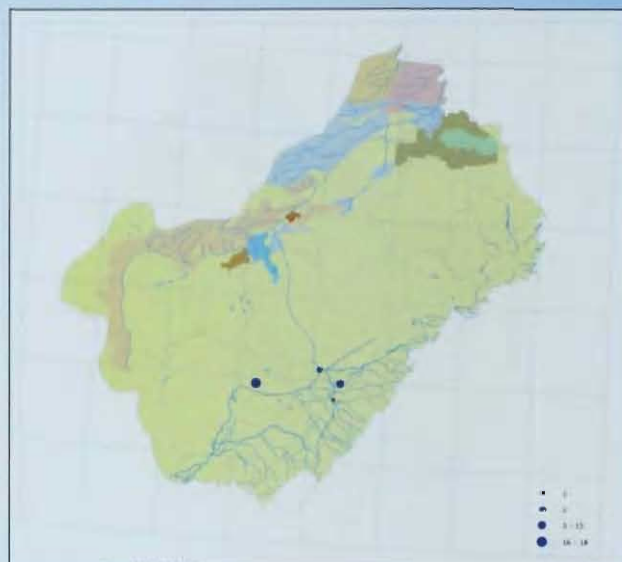
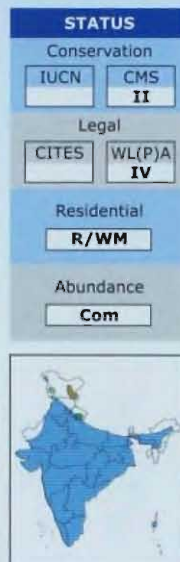
Habitat: Occurs at swampy glades in Fir and Rhododendron forests of Himalaya. **Habits:** Solitary, crepuscular and nocturnal, lies in shady cover during daytime, feeds by probing in soft earth. Breeds in Himalaya between 2000-3800 m from April to July; nests in ground depression. Arrives in south India by October and departs by end of March.

Food: Mainly carnivorous (ground worms), also plants and seeds. **Status and Distribution:** Resident in Himalaya, winter migrant to plains of India, locally common; Pakistan; Nepal; Bhutan; Bangladesh; Sri Lanka. Also breeds across C & E Asia, winter in S and SE Asia.



81. *Gallinago gallinago* (Linnaeus, 1758)

Common Snipe



Diagnostics: Grey Quail +; 25-27 cm; C; *Adult:* Sexes alike. Dark brown above heavily streaked with black, rufous and buff; whitish below; head with a buff median stripe and supercilium; bill olive-yellow on basal half and dark horny-brown to blackish on terminal half; tail-feathers 14 or 16; legs and feet dull olive-green. In flight, the long straight bill held downwards; distinguished from Pintail Snipe only when the bird is in hand. *Juvenile:* Like adults, but with whitish fringes on mantle feathers and wing-coverts. **Habitat:** Occurs at swampy edges of jheels, marshes around reservoirs, paddy stubble, muddy edges of rivers and pools. **Habits:** Solitary; occasionally in flocks; crepuscular and nocturnal, though feeds in daytime. Breeds from late April to mid-June, nest is a shallow depression lined with grasses. Starts arriving in plains by end of August/ September and departs by April. **Voices:** An urgent rasping *pench*. **Food:** Carnivorous, chiefly small molluscs, aquatic larvae and worms. **Status and Distribution:** Resident in Himalaya, between 1600-4500 m, in Kashmir and Garhwal, common and widespread winter migrant to rest of India; Pakistan; Nepal; Bhutan; Bangladesh; Sri Lanka; Maldives; breeds from NC Asia to Kamchatka, W Aleutians.



82. *Limnocyrtus minimus* (Brunnich, 1764)

Jack Snipe

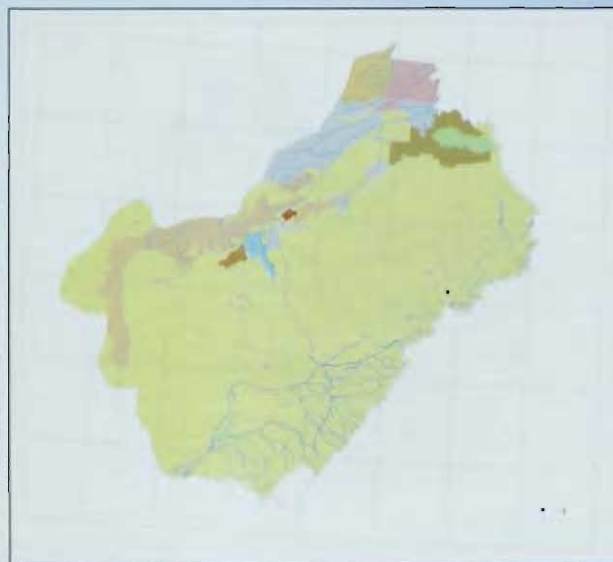


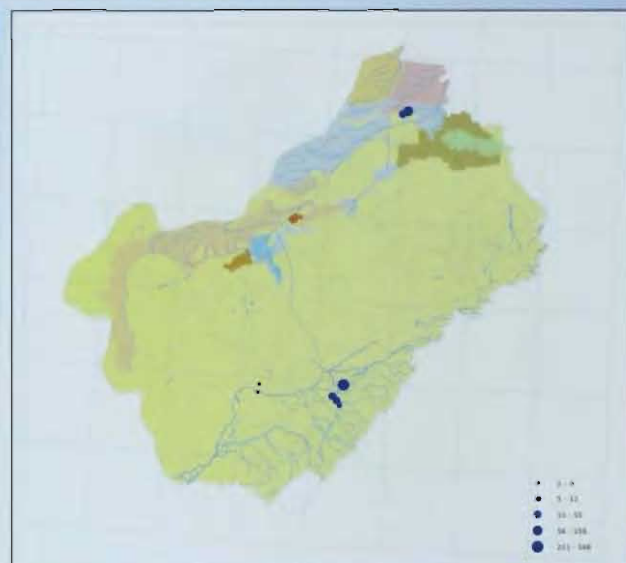
Photo: Svein Bekku

Diagnostics: Grey Quail \pm ; 17-19 cm; C/H; Sexes alike. The smallest snipe with relatively shorter and stouter bill, shining metallic green and purple back boldly streaked with buff, wedge-shaped tail, and pale olive-green legs and feet. **Habitat:** Found in swamps, around jheels, marshes, water logged paddy fields. **Habits:** Invariably solitary, generally crepuscular and nocturnal. Arrives by end of October and departs by April. **Voice:** Usually silent in winter, *kurr*. **Food:** Chiefly carnivorous on small molluscs, aquatic insects and larvae, occasionally on aquatic plants. **Status and Distribution:** An uncommon winter migrant to almost throughout India generally below 1500m, except parts of NW, NE and Himalaya; Pakistan; Nepal; Bangladesh; Sri Lanka; Myanmar. Breeds in C & E Siberia, winter in S Asia & Myanmar.



83. *Limosa limosa* (Linnaeus, 1758)

Black-tailed Godwit

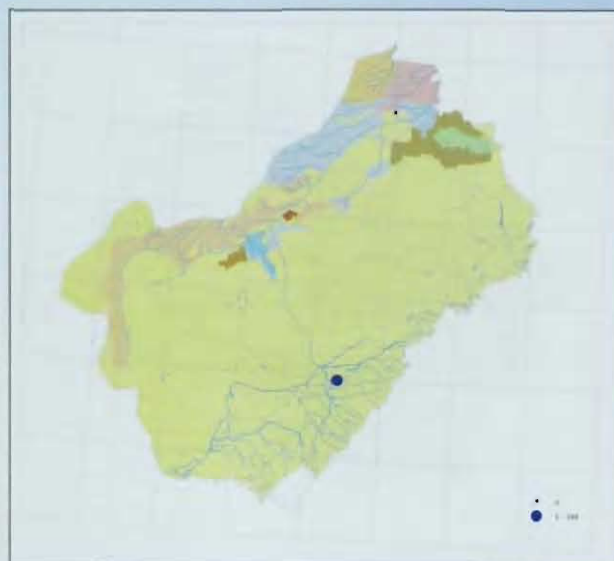


Diagnostics: Hen ~ 36-44 cm; C/H; *Adult:* Sexes alike but female slightly larger; bill long, slender and straight with red base and dusky tip; upperparts grey-brown, with white upper tail-coverts; underparts white, legs and feet greyish-green. In summer, assumes chestnut head and breast, bars on flanks; white chin, throat, abdomen and lower back. In flight, broad white wing-bars, white rump and black tail-tip distinctive. **Habitat:** A predominant freshwater species, found in inland jheels, shallows and mud banks of rivers, lakes and reservoirs, sometimes also in brackish lagoons, tidal waters and coastal saltpans. **Habits:** Gregarious, often occurs in large flocks, common at stagnant waters at the margins of drying jheels; flocks often wade into shallow water up to the belly feeding with head and neck submerged. **Voice:** Silent in winter, low trisyllabic *wit-wit-wit* or *quick-quick-quick*. **Food:** Chiefly carnivorous (molluscs, crustaceans), also seeds of aquatic plants. **Status and Distribution:** A locally common and widespread winter migrant to India extending eastward up to W. Bengal; Pakistan; Nepal; Bangladesh; Sri Lanka; Maldives. Breeds in C Asia, disjunct areas in C & E Siberia, winter in S & SE Asia, Philippines to Australia. **Threshold number:** 1,000.



84. *Limosa lapponica* (Linnaeus, 1758)

Bar-tailed Godwit

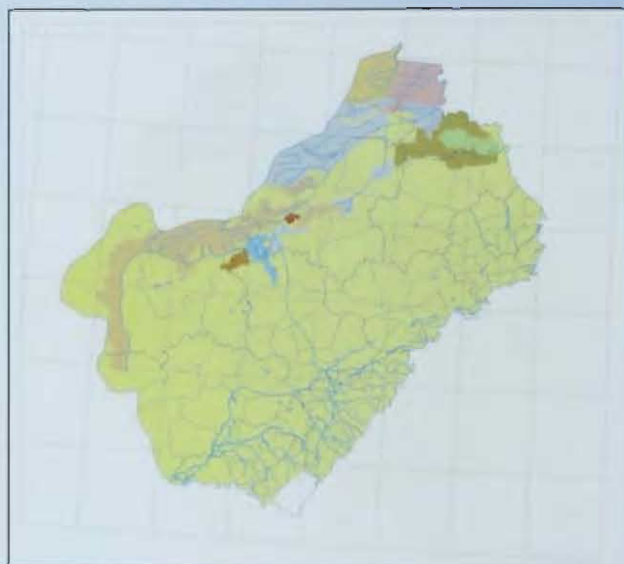
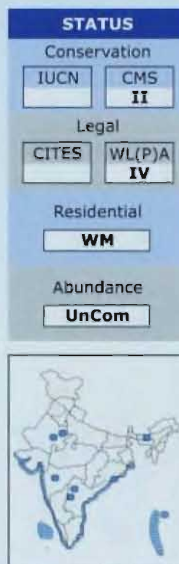
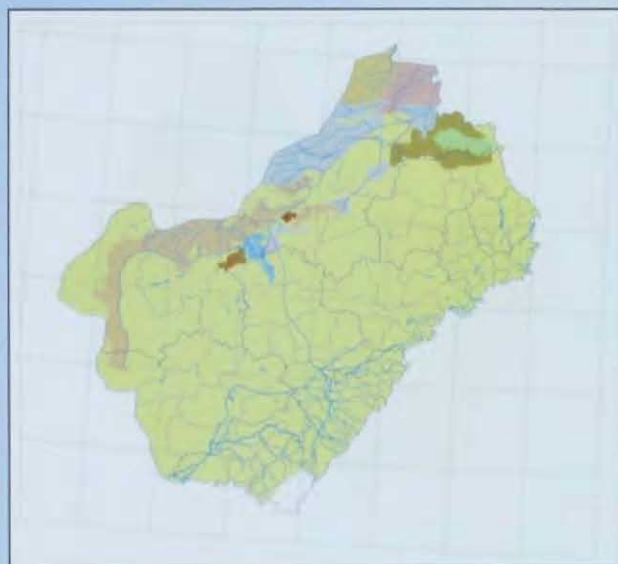


Diagnostics: Hen =; 37-41 cm; C; Sexes alike, except in summer: a dark-patterned sandy brown bird with parti-coloured black-and-white tail; flesh-coloured bill (terminal half-black); and greenish-grey legs and feet. **Non-breeding (winter):** Plumage like Black-tailed Godwit, but distinguished by slender straight bill slightly upcurved and shorter legs when the bird is at rest. **Breeding (summer):** Head, neck and underparts of the male are rich Rufous; female duller and browner. In flight, absence of white wing-bar and barred tail are pointers. **Juvenile:** Like adult in winter but the breast buff, mottled and streaked blackish. **Habitat:** Generally estuaries, lagoons and salt pans, rarely on inland waters, lakes, etc. **Habits:** Gregarious, mostly coastal in mixed flocks with Black-tailed Godwit and other waders, one of the earliest migrants from western coasts of the subcontinent. **Voice:** A barking kak-kak. **Food:** Carnivorous (molluscs, marine worms and insects). **Status and Distribution:** A wide spread but uncommon winter migrant, more frequent in NW India; Pakistan; Bangladesh; Sri Lanka and Maldives. Breeds in C Siberia, winter in Coastal Arabian Peninsula, S Iran E to NW India & E African Coast. **Threshold number:** 1,300.



85. *Numenius phaeopus* (Linnaeus, 1758)

Whimbrel

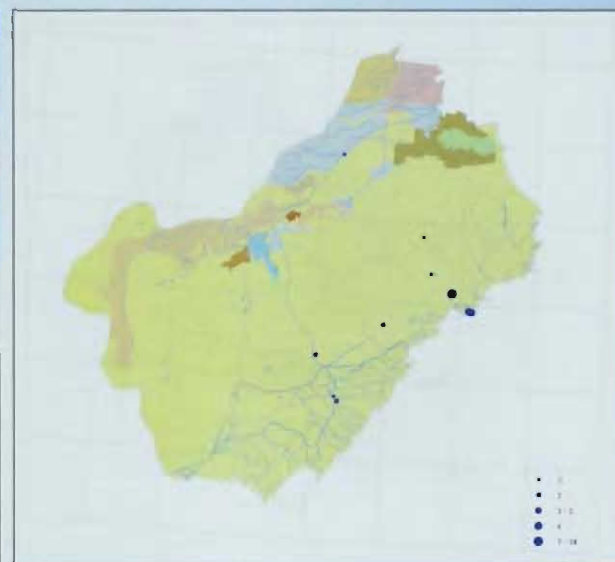


Diagnostics: Hen =; 40-46 cm; C; *Adult:* Sexes alike. Bill long, down curved, horny brown; crown black with one white median stripe and two white supercilious stripes; a dark brown band from lores through eye to ear-coverts. Upperparts sandy brown with whitish spots; lower back and rump white; tail ashy-brown with blackish bars; chin, throat and abdomen white, remaining underparts sullied; white-black streaks on foreneck and breast, and bars on flanks; legs and feet greenish-grey. *Juvenile:* Mantle buff-scalloped; lower back, rump and upper tail-coverts white, finely brown scalloped. **Habitat:** Mainly intertidal coastal mudflats, mudbanks of tidal creeks and mangroves; occasionally on inland waters when on passage. **Habits:** Gregarious, often found in flocks of 5-15 in winter, walks about on mud and feeds by picking up from surface or by probing. **Voice:** Distinctive whistle *he-he-he-he-he*. **Food:** Carnivorous (crabs, molluscs, crustaceans). **Status and Distribution:** An uncommon winter migrant to inland but locally common on Indian coasts; Pakistan; Nepal; Bhutan; Bangladesh; Sri Lanka; Maldives. Breeds in C, E Siberia, winter S Asia. **Threshold number:** 1,000.



86. *Numenius arquata* (Linnaeus, 1758)

Eurasian Curlew



Diagnostics: large hen =; 50-60 cm; C; **Adult:** Sexes alike. An unmistakable wader with long, slender and strongly downcurved dark brown bill; bluish-grey legs and feet; plumage, streaked buff and brown, abdomen whitish streaked with black; white lower back and rump conspicuous in flight. **Juvenile:** With more pronounced buff streaks on upperparts; white back; buff tinge on rump; narrow black streaks on breast and abdomen. **Habitat:** Occasionally on large lakes, mudflats, commonly around tidal estuaries and creeks. **Habits:** Keeps singly or in small flocks of about 6 birds, runs around and feeds between tidemarks, wary and difficult to approach. Starts arriving in India by October and departs by April end or early May. **Voice:** Plaintive *cur-lew*. **Food:** Carnivorous, comprising fiddler and sand crabs, crustaceans and insects. **Status and Distribution:** An uncommon winter migrant to the whole of the subcontinent, migrant mainly to the coastal areas; Pakistan; Nepal; Bangladesh; Sri Lanka; Maldives. Breeds in Siberia, winter in S, SW Asia. **Threshold number:** 1,000.



87. *Tringa erythropus* (Pallas, 1764)

Spotted Redshank

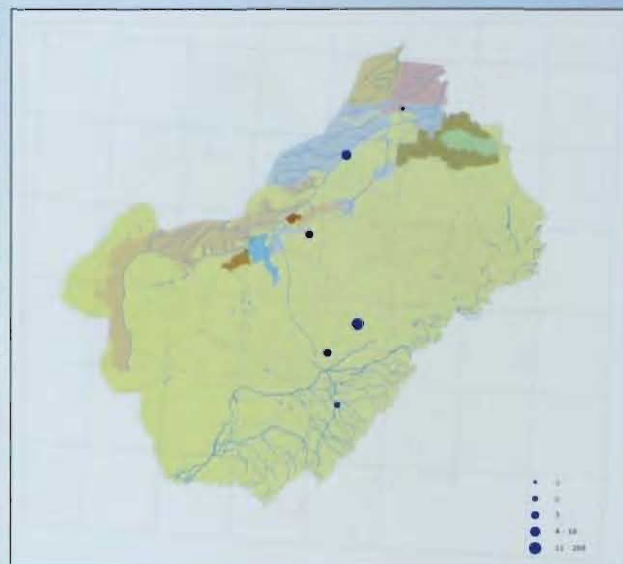
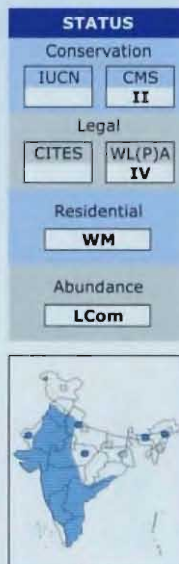


Photo: Vijay Cavale

Diagnostics: Grey Partridge \pm ; 29-32 cm; C; Sexes alike. **Non-breeding** (winter): Brownish-grey with faint white spots; red and black bill and red legs; head, hind neck and back ashy-brown; supercilia white; upper back with tiny white fringes on each feather; scapulars and inner secondaries notched with black and white; wing-coverts with broad white fringes; lower back, rump and tail-coverts white, the last barred with black; tail ashy-brown, barred with white on edges; underparts white with brown on neck and upper breast; dusky tinge on flanks. **Breeding** (summer): Overall sooty; black spotted; scalloped with white. **Habitat:** Occurs at inland jheels and tanks, muddy banks and shallow waters of lakes and rivers, also in tidal estuaries and creeks. **Habits:** Generally solitary or in small flocks in company of other waders, forages either in water or by picking from surface in open deep waters. Starts arriving in India by mid-September and departs by April end. **Voice:** Distinctive *tu-ick*. **Food:** Carnivorous (molluscs, crustaceans and insects). **Status and Distribution:** A locally common winter migrant in much of India including Kashmir, except Far east and the Himalaya, where scarce; Pakistan; Nepal; Bangladesh; Sri Lanka. Breeds in N Siberia, winter in NW India, Pakistan, NE India, Bangladesh. **Threshold number:** 250.



88. *Tringa totanus* (Linnaeus, 1758)

Common Redshank



STATUS

Conservation

IUCN

CMS

Legal

CITES

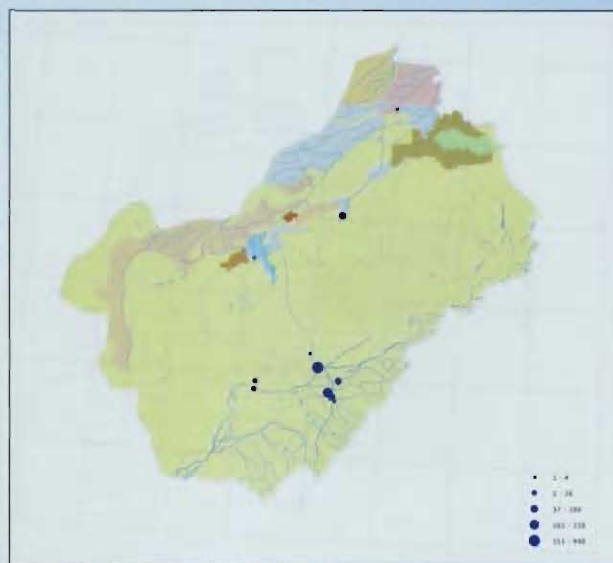
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Residential

R/WM

Abundance

Com

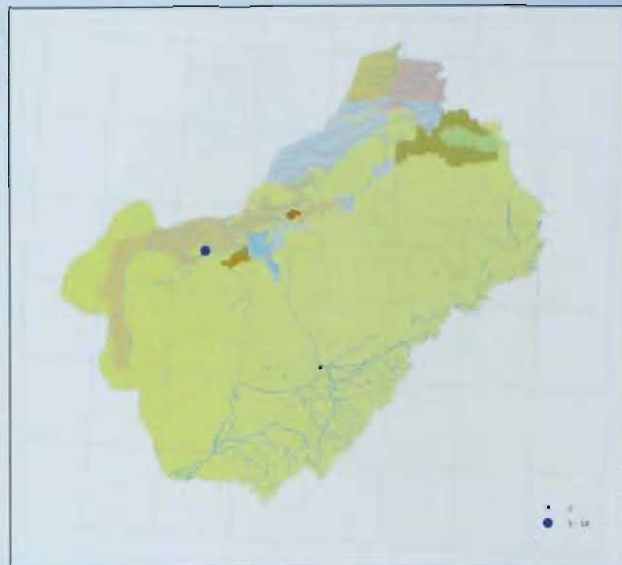
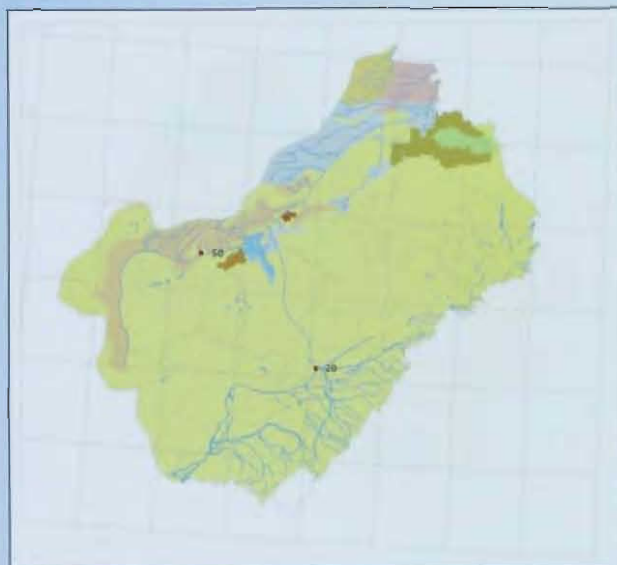


Diagnostics: Grey Partridge \pm ; 27-29 cm; C; *Adult:* Sexes alike. *Non-breeding* (winter): Mottled grey-brown above and white below with orange-red legs and basal third of bill; lower back, rump and tail white, the last barred with brown; breast finely streaked with brown. *Breeding* (summer): Upperparts streaked and spotted with black and fulvous; upper breast heavily streaked with brown; lower breast with dark crescent spots. The white edges to the dark grey wings and the white lower back and rump are diagnostic in flight. *Juvenile:* More rufous above; scapulars with fulvous spots; flanks with more black bands. **Habitat:** Found at marshes, muddy edges of rivers, lakes, muddy pools, mudbanks of mangroves, saltpans, tidal creeks and estuaries. **Habits:** Occurs solitary or in small groups with other waders, wary and noisy, feeds by picking from surface while walking, shallow water wader. **Voice:** Thrill piping *twi-ee-twi-ee*. **Food:** Carnivorous, comprising molluscs, aquatic insects and worms. **Status and Distribution:** A common winter migrant, except C and E India and part of Himalaya; Pakistan; Nepal; Bangladesh; Sri Lanka; Maldives. Breeds in Pamirs, Russia E of Ural, C & S Tibet, India (Ladakh, Kashmir and Sikkim between 4000-5000 m from May to July), winter in India, Sri Lanka. **Threshold number:** 10,000.



89. *Tringa stagnatilis* (Bechstein, 1803)

Marsh Sandpiper

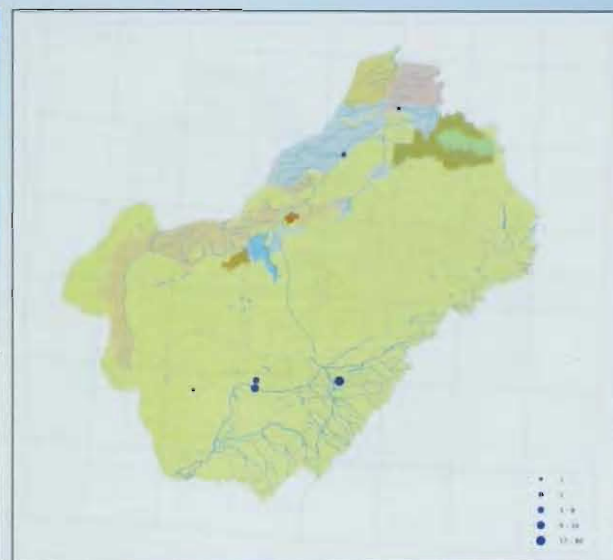


Diagnostics: Grey Partridge-; 22-25 cm; C; Sexes alike. *Non-breeding* (winter): Greyish-brown above and white below with white forehead, supercilium, sides of head, lower back and rump; black bill; greenish legs. *Breeding* (summer): Sandy grey above and white below with dark angular spots on back; brown spots on foreneck and upper breast; irregular bars on flanks; narrow bars on tail. **Habitat:** Occurs at swampy edges of freshwater ponds and jheels, paddy fields and marshes, also intertidal mudflats, brackish lagoons and saltpans. **Habits:** Generally solitary, sometimes in flocks with other waders, forages actively at the edges of water bodies or on mud, probes occasionally. Arrives in India by mid-August and departs by April end/early May. **Voice:** Series of *kiu-kiu-kiu*. **Food:** Carnivorous, comprising molluscs, crustaceans, insects and worms. **Status and Distribution:** A locally common and widespread winter migrant to India; Pakistan; Nepal; Bangladesh; Sri Lanka; Maldives. Breeds in Siberia, winter S Asia.



90. *Tringa nebularia* (Gunner, 1767)

Common Greenshank



Diagnostics: Grey Partridge +; 30-34 cm; C; Sexes alike, *Non-breeding* (winter): Dark greyish-brown above and white below. White forehead; lower back, rump and tail, the last with faint, almost invisible barring. Greyish on foreneck and sides of head; bill greenish-brown, blacker at tip and slightly upcurved; legs and feet olive-green. *Breeding* (summer): Darker above, with broad black centers on back and scapulars. In flight distinguished from Marsh Sandpiper by larger size, and from Redshank by absence of white wing-bar. Olive-green legs and slightly up curved bill. **Habitat:** Found at riverbanks, marshes, puddles, paddy fields tanks, wheels and brackish pools, coastal lagoons, tidal creeks and salt pans. **Habits:** Forages in scattered parties with other sandpipers, occurs in flocks of 15-20 birds when migrating, runs around on mud often probing for food, wades in shallow water. Arrives by second half of August in India and departs by April end or early May. **Voice:** A loud ringing *tu-tu-tu*. **Food:** Carnivorous (tadpoles, molluscs, crustaceans, insects). **Status and Distribution:** A locally common and widespread winter migrant all over India; Pakistan; Nepal; Bhutan; Bangladesh; Sri Lanka; Maldives; Breeds in C Asia, C&E Siberia, winter in S Asia. **Threshold number:** 1,000.



91. *Tringa ochropus* Linnaeus, 1758

Green Sandpiper

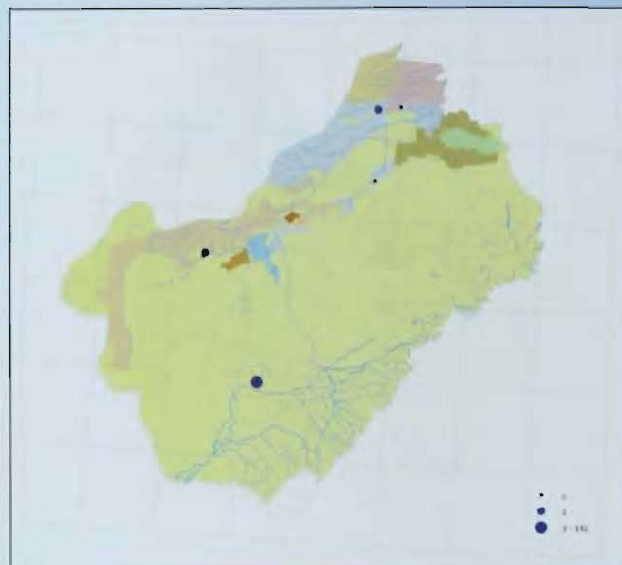
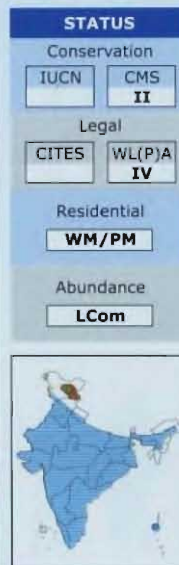


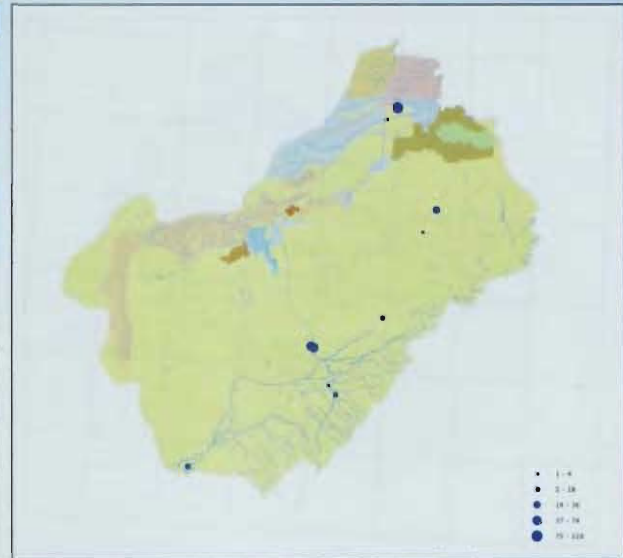
Photo: John Holmes

Diagnostics: Grey Quail +; 21-24 cm; C; *Adult:* Sexes alike. *Non-breeding* (winter): Head and neck ashy brown; remaining upperparts dark brown with green-bronze sheen; tail white with faint blackish terminal bars; underparts white with fine brown streaks on throat, breast and flanks. *Breeding* (summer): Darker, spotted lightly with white. *Juvenile:* With bronze narrow scalloping on upperparts and narrow bars with a broad terminal band on tail. Distinguished from similar Wood Sandpiper by more white on rump and tail, and darker surface of upper- and underwings. **Habitat:** Generally favours small wetlands like village tanks, puddles, streams, marshes and paddy fields, though affect lakes. **Habits:** Generally solitary, gathers into small flocks of 15 to 20 at migration, not found in company of other waders; runs about and feeds at water edge, also wades in shallow water and probes by bill. **Voice:** Shrill piping *ti-tui* or *twee-twee-twee*. **Food:** Carnivorous- molluscs, crustaceans and aquatic insects. **Status and Distribution:** A locally common and widespread winter and passage migrant to much of India up to 2000 m; Pakistan; Nepal; Bhutan; Bangladesh; Sri Lanka. Breeds in Casia to E Siberia, winter in S and SE Asia.



92. *Tringa glareola* Linnaeus, 1758

Wood Sandpiper

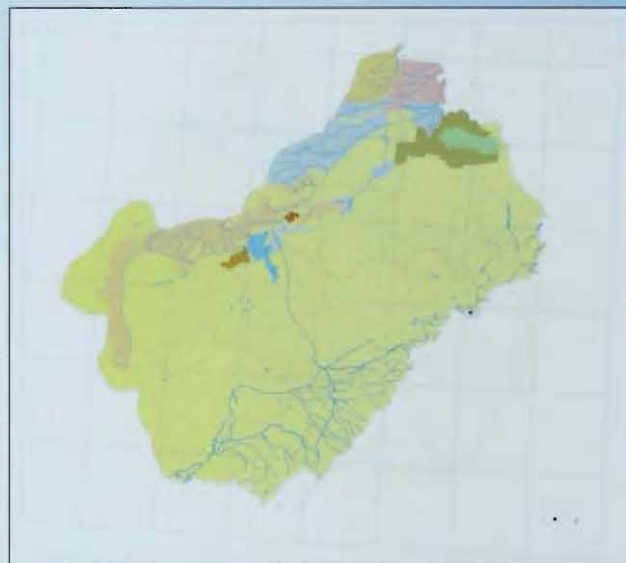
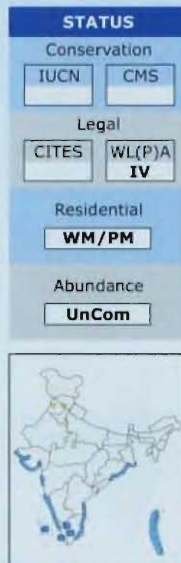


Diagnostics: Grey Quail \pm ; 18-21 cm; C; Sexes alike. **Non-breeding (winter):** Grey-brown above spotted white; white below with dusky breast; bill blackish; supercilium whitish; lower back, rump and tail white, the last blackish barred; legs and feet olive-green. **Breeding (summer):** Darker with conspicuous white spots. In flight, grey-brown upperparts, white rump, barred brown-and-white tail, and absence of wing-bar is diagnostic. **Habitat:** Affects jheels with emergent vegetation, marshes, village tanks, paddy fields, irrigation tanks in lowlands, and tidal creeks, occasionally up to 2000 m. **Habits:** Gregarious, often in flocks of 20-30, still larger flocks at the time of migration, when also show territorial behaviour, wades for feeding in shallow waters. **Voice:** Soft chip, chip, chip. **Food:** Carnivorous, comprising tiny fishes, molluscs, crustaceans. **Status and Distribution:** A locally common winter migrant to much of India; Pakistan; Nepal; Bhutan; Bangladesh; Sri Lanka; Maldives. Starts arriving in India by August end and depart by March/May. Breeds in C & E Siberia to Kamchatka, Commander Is., winter in S Asia. **Threshold number:** 10,000.



93. *Xenus cinereus* (Guldenstadt, 1774)

Terek Sandpiper

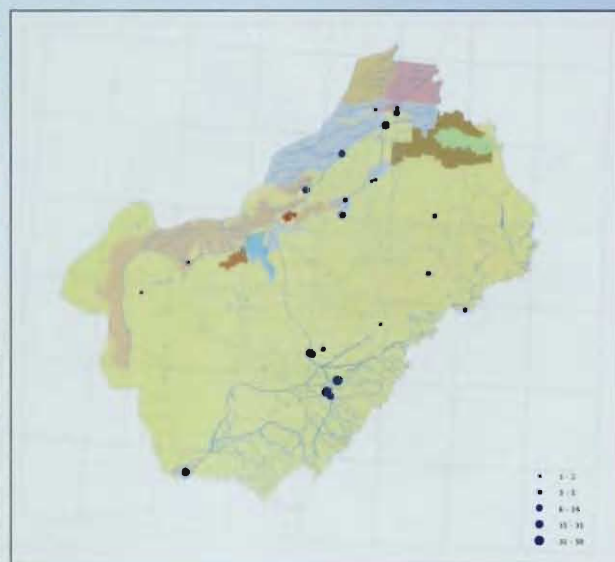
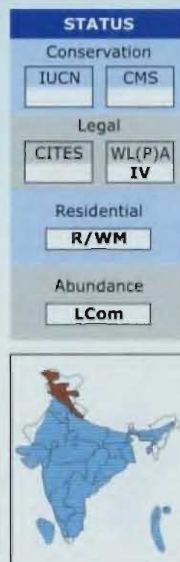


Diagnostics: Grey Quail +; 22-25 cm; C; Sexes alike; an unmistakable bird with long, slender and upcurved bill (yellow base and black or dark brown tip); orange-yellow short legs. **Non-breeding** (winter): Forehead and supercilia white; upperparts greyish-brown with blackish streaks; underparts pure white. **Breeding** (summer): Sides of head and neck, and breast streaked with brown; upperparts boldly streaked with black. **Habitat:** Seashores, mudbanks of mangrove creeks and coastal lagoons. **Habits:** Gregarious, keeps in small flocks of 10-15 birds, generally feeds on seashore between the tidemarks. **Voice:** Soft *toot-twit-twit*. **Food:** Carnivorous- small molluscs, crustaceans and aquatic insects. **Status and Distribution:** A common winter migrant to the coastal areas, uncommon passage migrant to inland areas of the country like Punjab; Pakistan; Nepal; Bangladesh; Sri Lanka; Maldives. Starts arriving by early August and departs by April/May. Breeds in Boreal Siberia, winter in S India and Sri Lanka. **Threshold number:** 1,000.



94. *Actitis hypoleucos* Linnaeus, 1758

Common Sandpiper



Diagnostics: Grey Quail =; 19-21 cm; C; Sexes alike. *Non-breeding* (winter): Olive-brown above and white below with more ash-brown on head and sides of neck; supercilia pale and indistinct; rump and tail brown with only the outer tail-feathers white; breast lightly brown-streaked; a prominent small white patch-dividing band of wing from side of breast. *Breeding* (summer): Darker above and speckled; foreneck and breast boldly brown-streaked. In flight distinguished by white wing-bar and brown rump. **Habitat:** Hill streams and rivers during breeding season; in winter affects freshwater bodies, village tanks, stream banks, ditches, rivers, canals, lakes; tidal creeks, rocky seashores, harbours and docks. **Habits:** Generally solitary or in twos or threes in non-breeding season; runs along water edge and picks up tidbits from ground or vegetation; regularly wags its tail and bobs the head constantly while feeding. **Voice:** Alarming note tee-tee-tee. **Food:** Carnivorous- small molluscs, crustaceans, aquatic insects. **Status and Distribution:** Breeds in higher elevations of Kashmir, Ladakh and Garhwal between 1800-3200 m in May and June; locally common winter migrant to all over India; Pakistan; Nepal; Bhutan; Bangladesh; Sri Lanka; Maldives. Breeds in C Asia, Siberia, winters in S Asia.



95. *Calidris minuta* (Leisler, 1812)

Little Stint

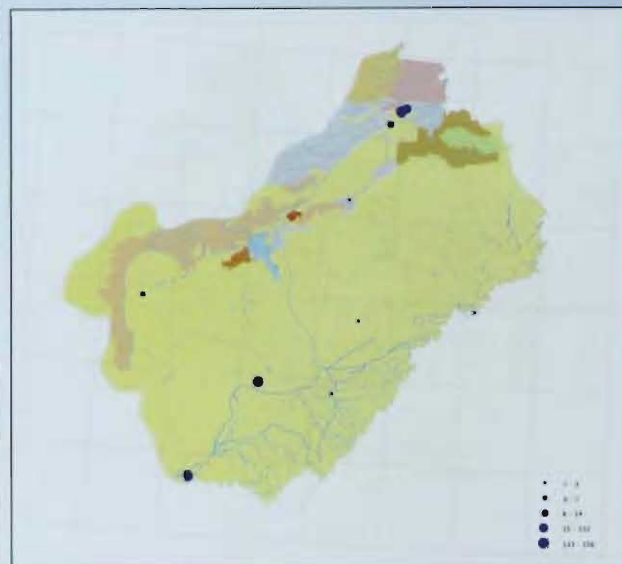
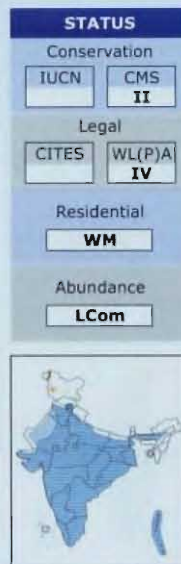
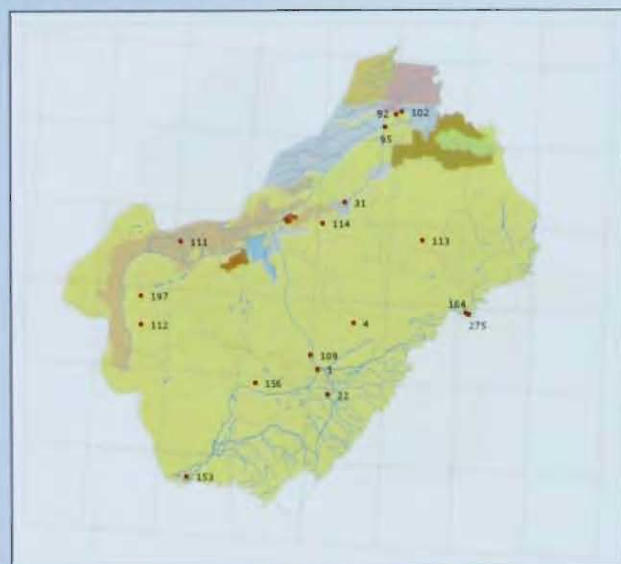


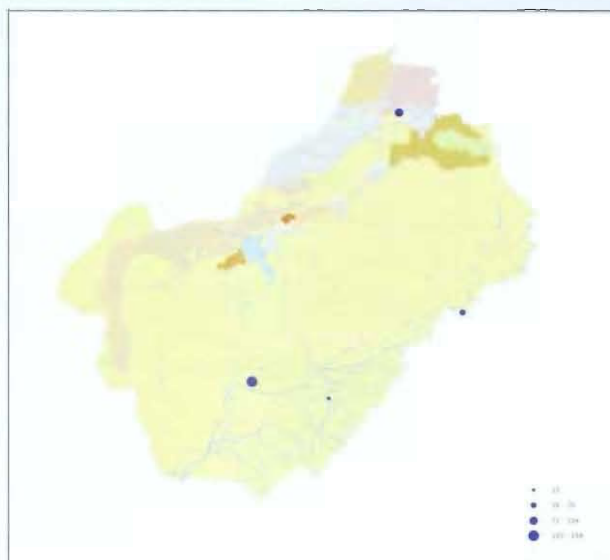
Photo: Gokulade Silva Wajayaratne

Diagnostics: Grey Quail -; 13-15 cm; C/H; **Adult:** Sexes alike. **Non-breeding (winter):** Bill black; forehead and supercilia white; upperparts 'scaly' grey-brown with smoky brown outer tail feathers; underparts white with faint streaks on breast; legs and feet blackish. **Breeding (summer):** Has forehead and supercilia often obsolete pale fawn; feathers on back black with broad rufous edges; foreneck and upper breast indistinctly spotted dark brown. **Juvenile:** Like adult in summer, but hind neck greyer and mantle less rufous, white below. **Habitat:** Found at tidal creeks, mudflats, coastal lagoons, marshes, jheels, lakes and paddy fields in winters. **Habits:** Gregarious, often found in large flocks of hundreds mixed with other waders in coastal areas, constantly runs around on mud picking up food, when disturbed whole flock flies simultaneously and swiftly like a cloud. Starts arriving in India in small numbers by August and departs by April/May. **Voice:** Weak *pl, pl, pl*. **Food:** Chiefly carnivorous, comprising small molluscs, crustaceans, insects, also aquatic plants and seeds. **Status and Distribution:** A wide spread winter migrant to both the coasts of India and inland, except higher Himalaya and extreme NW and NE regions of the country; Pakistan; Nepal; Bangladesh; Sri Lanka; Maldives. Breeds in NW & NC Siberia to New Siberian Is & R Yana, winters in Subcontinent, Sri Lanka, India & Myanmar. **Threshold number:** 2000.



96. *Calidris temminckii* (Leisler, 1812)

Temminck's Stint

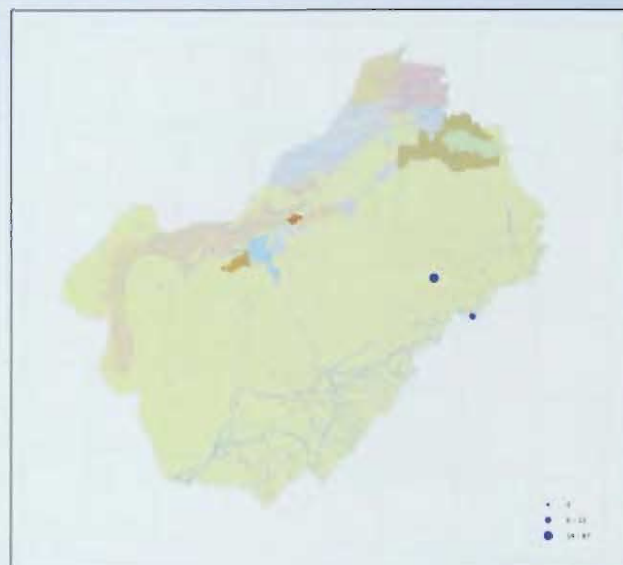
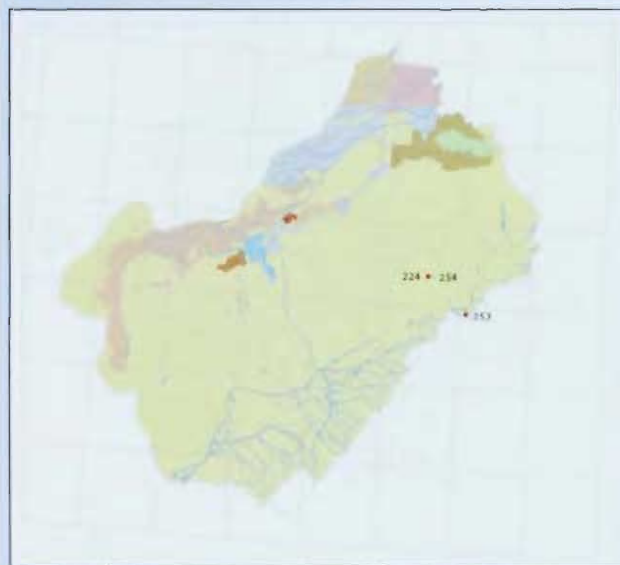


Diagnostics: House Sparrow +; 13-15 cm; C/H; Sexes alike; very similar to little Stint but distinguished by more uniform grey-brown upperparts; brownish fore head; white outer tail-feathers and greenish legs. *Non-breeding* (winter): brown-ash-grey upper parts, breast-band and less distinct supercilium; underparts white. *Breeding* (summer): similar to non-breeding but has browner head, breast and upper parts. **Habitat:** Prefers fresh water habitats with vegetation, riverbanks, pools, lakes, brackish marshes, mudflats and tidal lagoons. **Habits:** Often solitary, though sometimes occurs in small flocks of about 20 birds, forages at the margins and feeds slowly, picking prey from vegetation or mud. Starts arriving in India by September/October and returns by May. **Voice:** Thin trrrrit. **Food:** Chiefly carnivorous (small molluscs, crustaceans, insects), occasionally aquatic plants. **Status and Distribution:** A locally common widespread winter migrant to all over the country, except part of Himalaya, NW and NE; Pakistan; Nepal; Bhutan; Bangladesh; Sri Lanka; Maldives. Breeds in N Siberia, winters in S Asia. **Threshold number:** 1,000.



97. *Calidris alpina* (Linnaeus, 1758)

Dunlin

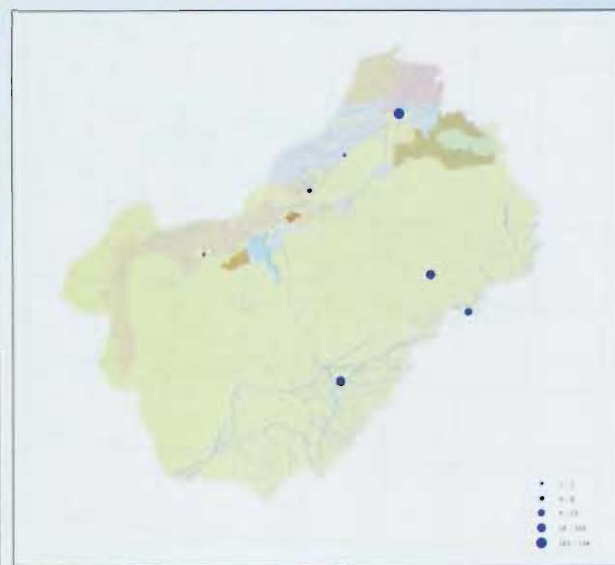


Diagnostics: Grey Quail -: 16-22 cm; C; Sexes alike. *Non-breeding* (winter): Upperparts grey-brown; throat, belly and under tail-coverts white; breast streaked grey; bill black, long and slightly downcurved near tip. *Breeding* (summer): has head and upperparts chestnut boldly mottled with black; underparts white, except centre of breast and abdomen black. In flight, the white wing-bar, as in Curlew Sandpiper, conspicuous, but differs from it by black upper tail-coverts instead of white. **Habitat:** Sea shore, intertidal mud-flats, creeks, riverbeds, flooded fields and sandbars. **Habits:** Gregarious, keeps in flocks mixed with other waders, scatters to feed on wet mud as well by wading near water edges, flies swiftly in close pack. Starts arriving in India by August and departs by mid-May. **Voice:** shrill *tue-ep*. **Food:** Carnivorous, comprising molluscs, crustaceans, aquatic insects. **Status and Distribution:** A locally common winter migrant chiefly to the western coast of India, occasionally inland; Pakistan; Nepal; Bangladesh; Sri Lanka; Maldives. Breeds in NC Siberia, winters in Caspian, SW Asia. **Threshold number:** 1,000.



98. *Calidris ferruginea* (Pontoppidan, 1813)

Curlew Sandpiper



STATUS

Conservation

IUCN CMS II

Legal

CITES WL(P)A IV

Residential

WM

Abundance

UnCom

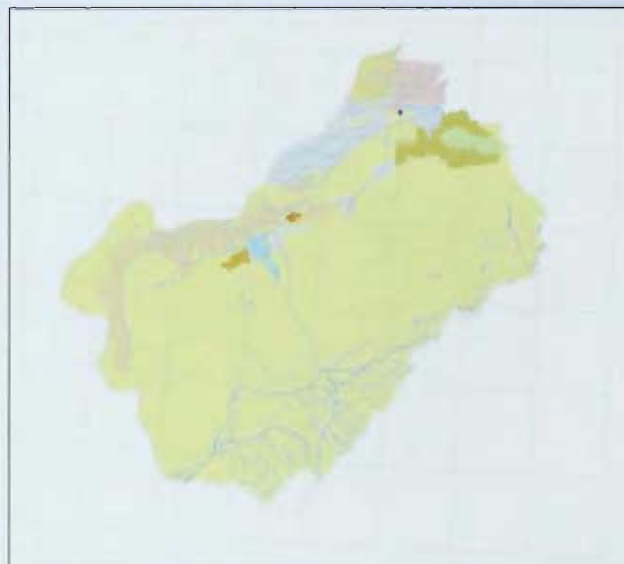
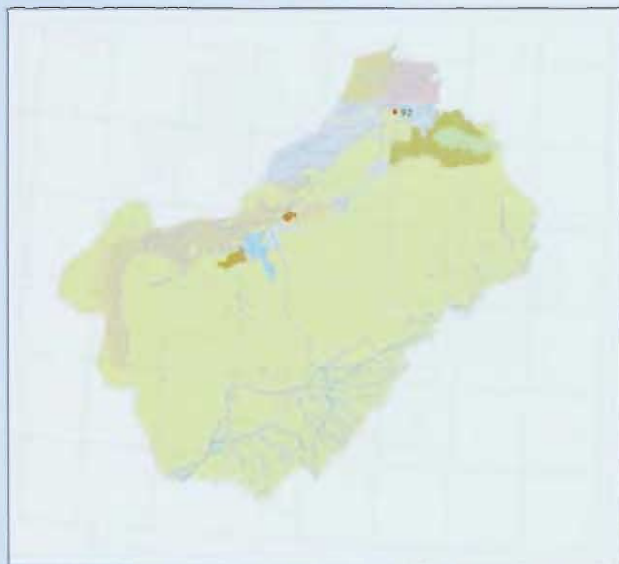


Diagnostics: Dunlin \pm ; 18-23 cm; C; Sexes alike. Often confused with Dunlin but differs by its slightly larger size, longer legs and similarly downcurved but more slender bill. In flight, it is distinguished by its white tail-coverts. **Non-breeding** (winter): Upperparts mottled grey-brown. Underparts white, with brownish wash and streaks on breast. **Breeding** (summer): Upper- and underparts mainly chestnut and rich rufous, crown and mantle grey-brown, fairly distinct supercilium from the forehead to nape. Underparts white. **Habitat:** Chiefly coasts, seashore, mudflats and salt pans, rarely on inland lakes and rivers. **Habits:** Gregarious, often in flocks with other waders, while foraging runs over wet mud near the edges, feeds by pecking or probing. **Voice:** soft chirrup. **Food:** carnivorous, comprising mollusc, crustaceans and worms. **Status and Distribution:** Un Common winter migrant chiefly to the coasts, very common WM on west coast, rarely inland in small numbers as passage migrant; Pakistan; Nepal; Sri Lanka; Maldives. Breeds in Arctic Siberia, winters in S Asia, Myanmar. **Threshold number:** 1,000.



99. *Limicola falcinellus* (Pontoppidan, 1763)

Broad-billed Sandpiper

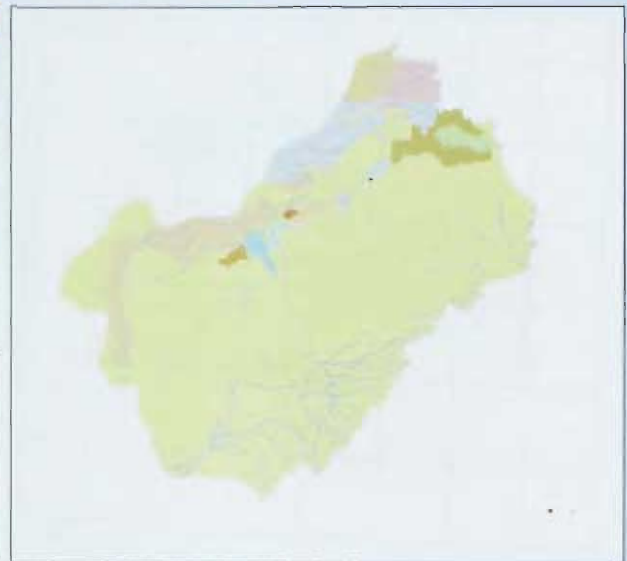
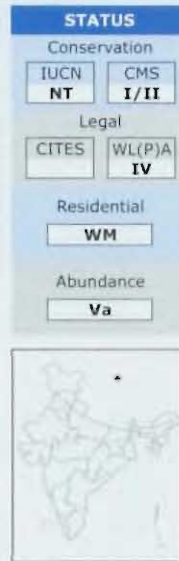


Diagnostics: Quail ±; 16-18 cm; C; Sexes alike. *Non-breeding* (winter): Bill horny black with broad base and slightly downcurved; supercilium short and white; upperparts mottled dark grey-brown, with a blackish patch on wing-shoulder; rump, upper tail-coverts and middle rectrices brown; underparts white with streaks on breast; legs and feet yellowish grey. *Breeding* (summer): Upperparts black with rufous and white markings; back has buff stripes; a double eye-stripe. **Habitat:** Muddy creeks, intertidal mudflats, brackish lagoons and sandbanks of large rivers. **Habits:** Generally solitary in winters or small flocks when on passage; feeds by pecking and probing. Starts arriving by July end and August and departs by May end. **Voice:** twittering flushing note. **Food:** Carnivorous (molluscs, aquatic insects, worms). **Status and Distribution:** Uncommon winter migrant to coasts, common in extreme SE coastal region, rare inland; Pakistan; Bangladesh; Sri Lanka. Breeds in Scandinavia, NW Russia, winters in south Mediterranean, Black, Caspian and Red Seas, Middle East, W & S India, Sri Lanka. **Threshold number:** 630.



100. *Tryngites subruficollis* (Vieillot, 1819)

Buff-breasted Sandpiper

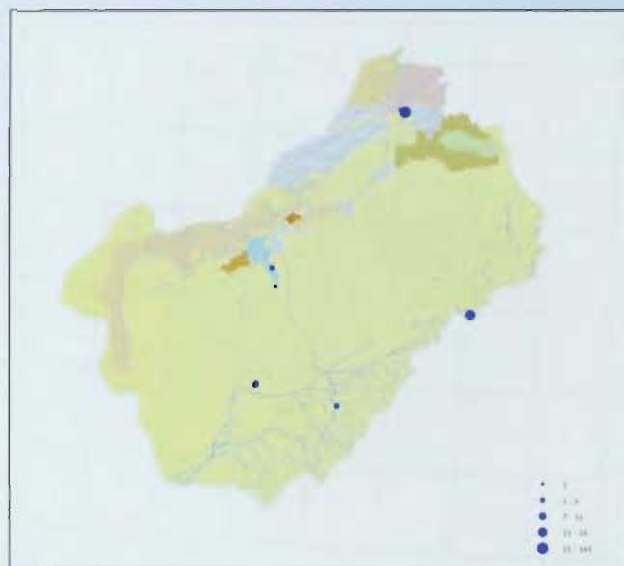


Diagnostics: Common Sandpiper \pm ; 18-20 cm; C; Sexes alike. Bill short and straight, eyes large, upperparts blackish with buff scalloping, face and underparts buff, legs bright yellow. In flight, lacks obvious wing-bar and have more uniform upper tail-coverts. **Adult:** unmarked buff face, black eyes; black streaks on crown and hindneck; upperparts with dark feathers; underparts buff. **Juvenile:** Like adult but buff centres and dark terminal crescents to pale-fringed feathers of mantle and scapulars. **Habitat:** Dry short-grass, dry mudflats and seashore. **Habits:** Feeds actively by picking prey from the ground and vegetation, does not wade, walks quickly, flight rapid and erratic. **Voice:** Generally silent. **Food:** Carnivorous, mainly insects. **Status and Distribution:** Vagrant to India and Sri Lanka. **Threshold number:** 150 (American and Canadian population). **Remarks:** Single record from Punjab (Griffith, *et al.* 1998).



101. *Philomachus pugnax* (Linnaeus, 1758)

Ruff

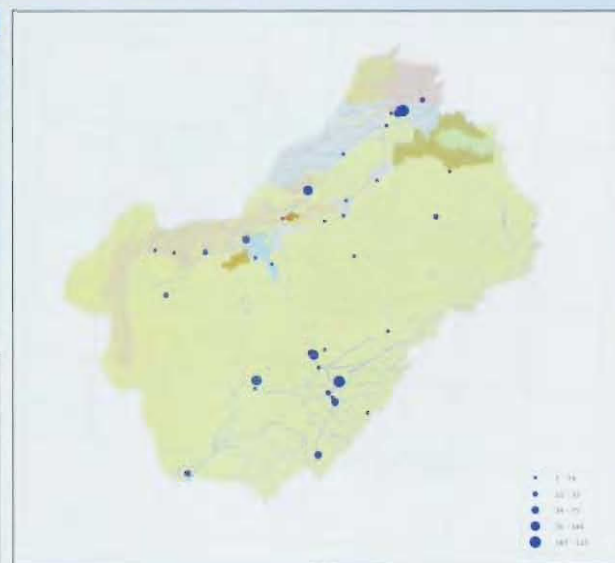


Diagnostics: Grey Quail +; 26-32 cm; C/H; *Non-breeding* (winter): A greyish-brown wader with bold scaly-patterned upperparts; relatively short, dark brown bill with yellowish base; varying orange-yellow legs. *Breeding* (summer): Upperparts of both sexes blackish, feathers edged with buff or rufous; breast flanks etc. suffused with brown. *Male* (Ruff): Face covered with yellow caruncles and grows an enormous ruff, extending from nape to cover the entire breast. The ruff may be of any colour—chestnut, buff, white, black or grey. *Female* (Reeve): Upperparts blackish, sometimes with black linear spots or broken bars on pale fulvous breast. **Habitat:** Affects flooded paddy fields, freshwater lakes, pools, marshes, grassland, intertidal mudflats and estuaries. **Habits:** Gregarious, generally in small flocks of about 25 birds in company of other waders, though may congregate in large numbers at arrival and departure time in NW India and on chosen feeding grounds. Starts arriving by August/September and departs by February/March. **Voice:** Generally silent, low *chugh-chugh*. **Food:** Mainly carnivorous, comprising molluscs, crustaceans, aquatic insects, occasionally exclusively on aquatic plants. **Status and Distribution:** A winter migrant to NW and extreme SE India; a common passage migrant in Pakistan; Nepal; Bangladesh; Sri Lanka; Maldives. Breeds in W, C & E Siberia, winters in S Asia. **Threshold number:** 1,000.



102. *Himantopus himantopus* (Linnaeus, 1758)

Black-winged Stilt



Diagnostics: Grey Partridge \pm ; 35-40 cm; C/H; **Adult:** A lanky black and white wader with painted wings, black bill and crimson-red legs. **Male:** Head white with a few black spots; wings glossy black above and black below; tail pale grey-brown; remaining body glossy white. **Female:** Head and hind neck white sullied with brownish grey, wings brown above and black below. Duller in winter. **Juvenile:** Young males with black anterior crown, upper ear-coverts and a line down the back of the neck. **Habitat:** Affects freshwater and brackish water marshes, pools, village tanks, reservoirs, and shallow margins of lakes, jheels, lagoons and saltpans. **Habits:** Gregarious, occurs in small flocks round the year, though larger groups of 100 or more birds found occasionally, breeds in colonies, walks slowly, forages by wading or on dry mud, also floats sometimes for feeding. Breeds between March and August. **Nest:** on a mound surrounded by shallow water or on dry bank. **Voice:** noisy readily agitated, kek, kek. **Food:** Chiefly carnivorous (molluscs, aquatic insects), marshy vegetation, seeds. **Status and Distribution:** A common resident species throughout India, breeds at 1500 m in Himalaya (Kashmir); subject to local movements in winter; Pakistan; Nepal; Bangladesh; Sri Lanka; Maldives; breeds in S Asia. **Threshold number:** 10,000.



103. *Recurvirostra avosetta* Linnaeus, 1758

Pied Avocet

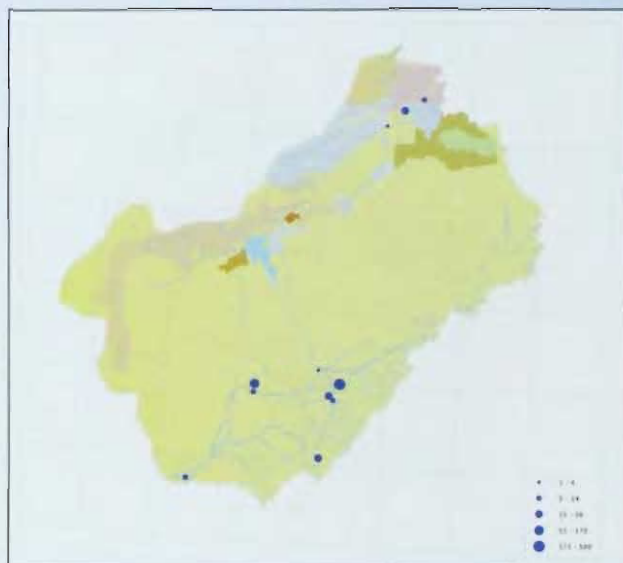
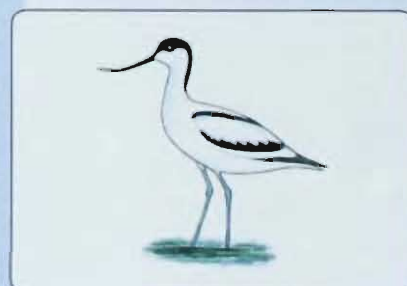


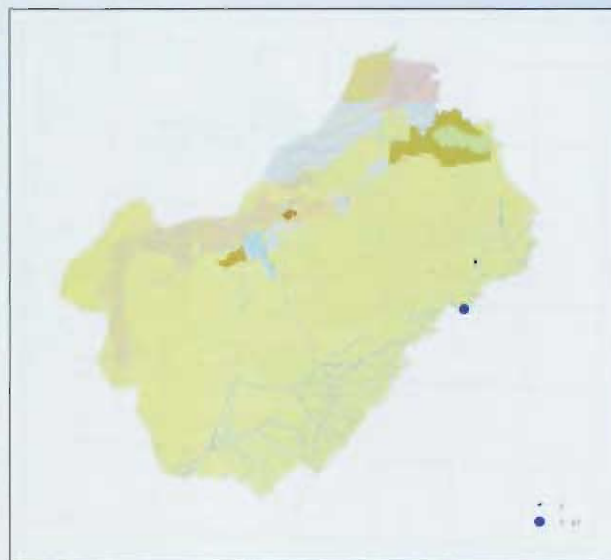
Photo: Gill Laidy

Diagnostics: Grey Partridge +; 42-45 cm; C; *Adult:* Sexes alike. An unmistakable marsh bird with conspicuously upcurved long black bill; dark red iris; glistening white body, black head, hind neck and two wing-bands, and bluish-grey legs. In winter, the tail is greyish, the long secondaries more grey and less black. **Habitat:** Generally found at shallow brackish pools, jheels, swamps, mudflats, also tidal creeks, salt pans and estuaries. **Habits:** Generally occurs in pairs or small parties though flocks of about 100 birds may be found, nests in colonies, runs about on mudflats and feeds by sweeping bill from side to side from water surface or mud, swims like dabbling duck. **Voice:** High-pitched *klooit, kweet-kweet*. **Food:** Carnivorous, comprising small molluscs, crustaceans and insects. **Status and Distribution:** A locally common winter and passage migrant to NW India, within our limits only one breeding record in Gujarat, though could happen more often (Mundkur, pers. com.); Pakistan; Nepal; Bhutan; Bangladesh; Sri Lanka. Breeds in C Asia, winters in S Asia. **Remarks:** The species was adopted as the symbol of bird conservation in Britain and Ireland in the 1940s. **Threshold number:** 1,000.



104. *Phalaropus lobatus* (Linnaeus, 1758)

Red-necked Phalarope

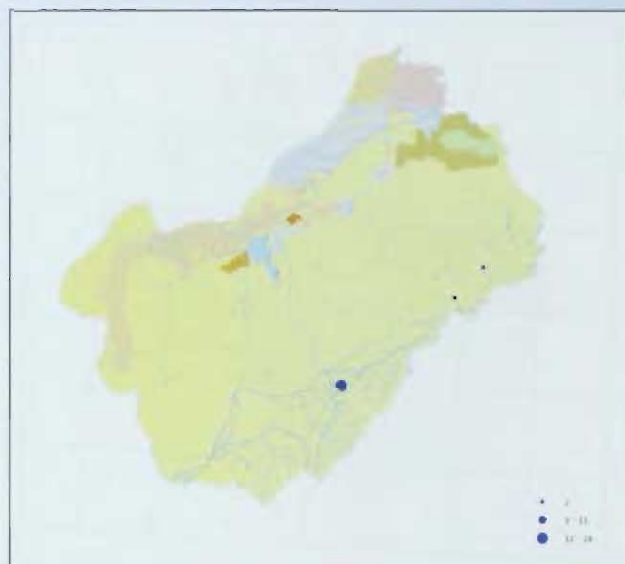
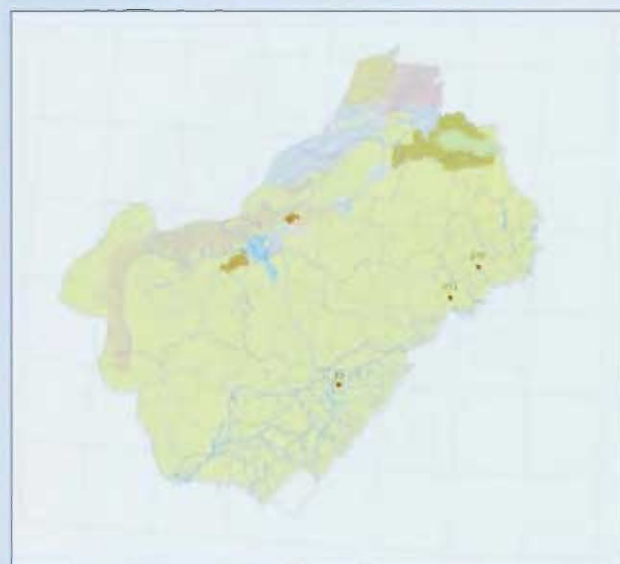


Diagnostics: Quail \pm ; 18-19 cm; C; Female brighter and larger; A sandpiper-like bird with blackish bill. **Non-breeding** (winter): Crown, nape, a broad line through eyes and legs blackish; remaining upperparts grey streaked with white; forehead, underparts and wing-bar white. **Breeding** (summer): Upperparts blackish-grey, sides of neck and foreneck rich rufous forming a broad band. Male duller, the rufous band divided by dark grey on the foreneck. **Habitat:** Winters at sea, affects shallow coastal waters, occasionally inland lakes and pools as passage migrant during winter. **Habits:** Pelagic, gregarious offshore, swims buoyantly like a cork and spins round, extremely tame in freshwaters, also wades when foraging. **Voice:** generally silent, twick in flight. **Food:** Chiefly insectivorous, also on macro planktons. **Status and Distribution:** an uncommon winter migrant along the western coast of Gujarat, and Tamil Nadu, very rare inland passage migrant, arrives by September; Pakistan; Nepal; Sri Lanka. Breeds NE Siberia winters in NW Arabian Sea.



105. *Esacus recurvirostris* (Cuvier, 1829)

Great Stone-Plover

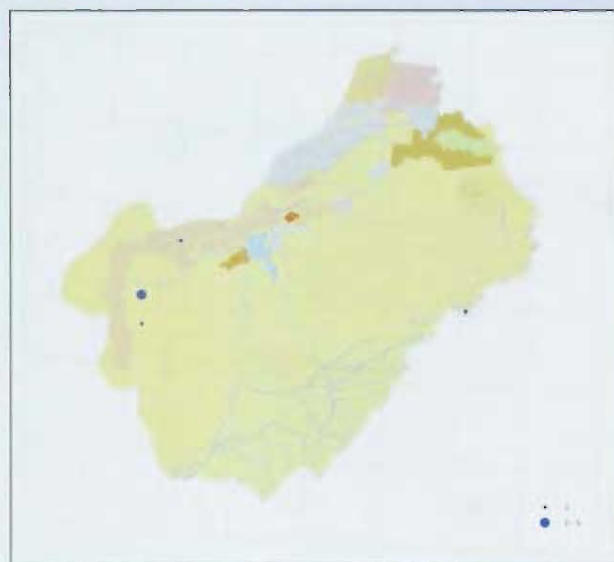


Diagnostics: domestic hen =; 49-54 cm; C; **Adult:** Sexes alike; a massive-billed sandy brown plover, with greenish-yellow legs. Bill stout and black with yellow base, distinctly upturned; lores, feathers round the eye and supercilium white; eyes large and yellow with two blackish bands resembling 'goggles'; primaries, innermost secondaries and scapulars black; tail ashy-brown with pale tip and two irregular dark bars; a short grey-brown moustachial streak, remaining lower plumage white. **Juvenile:** Paler. **Habitat:** Generally in deciduous habitats such as stony beds of large rivers and lakes with pebbled shores, salt marshes, estuaries and salt pans. **Habits:** Crepuscular and nocturnal but prefers sunlight during day, inhabits water edges, if disturbed, camouflage or runs off; breeds from February to June. Nest on exposed sandbank on riverbeds. **Voice:** loud, harsh, kree-kree-kree. **Food:** Carnivorous, chiefly crabs, molluscs and insects also fish, frogs and reptiles. **Status and Distribution:** A widespread but un-common resident species all over India, especially plains; Pakistan; Nepal; Bangladesh; Sri Lanka, SE Asia.



106. *Glareola pratincola* (Linnaeus, 1766)

Collared Pratincole

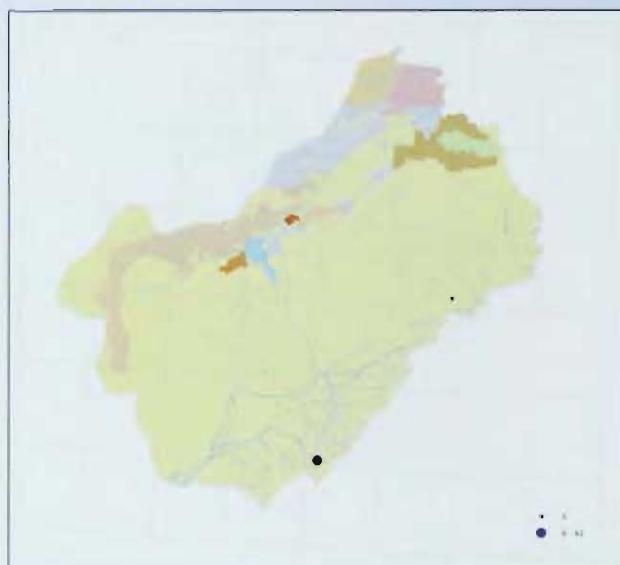
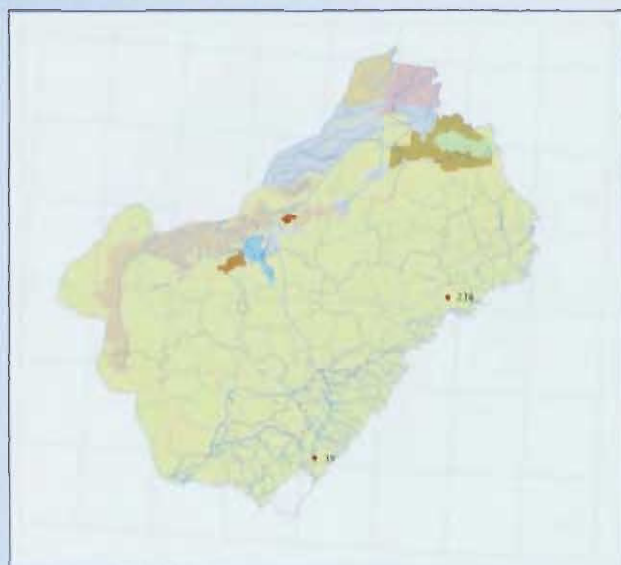


Diagnostics: Myna \pm ; 16-19 cm; C; **Adult:** Sexes alike. A short-legged bird with long, narrow and pointed 'tern-like' wings; black bill; ashy-black legs and feet; olive-brown upperparts; white upper tail-coverts; black tail with white base; creamy chin and throat with narrow black border; brown upper breast; white abdomen and under tail-coverts. **Juvenile:** Like adult but upper feathers pale tipped with black subedges; breast mottled brown and rufous-white; black neckline absent. **Habitat:** Occur at barren rivers, flood-plains, grazing land around jheels, swamps and tidal creeks. **Habits:** Generally crepuscular, gregarious, active on cloudy days, usually sluggish and squats on open sandbank in rivers or grazing land. **Voice:** Tern like *kirik-kirik, kit-kit-kit*. **Food:** Insectivorous, mainly moths, beetles and swarming ants and termites. **Status and Distribution:** Rare winter migrant to NW India; Pakistan; Sri Lanka. Breeds in Mediterranean, Black Sea, Middle East up to W Pakistan, winters in Africa and SW Asia. **Threshold number:** 240.



107. *Glareola lactea* Temminck, 1820

Small Pratincole

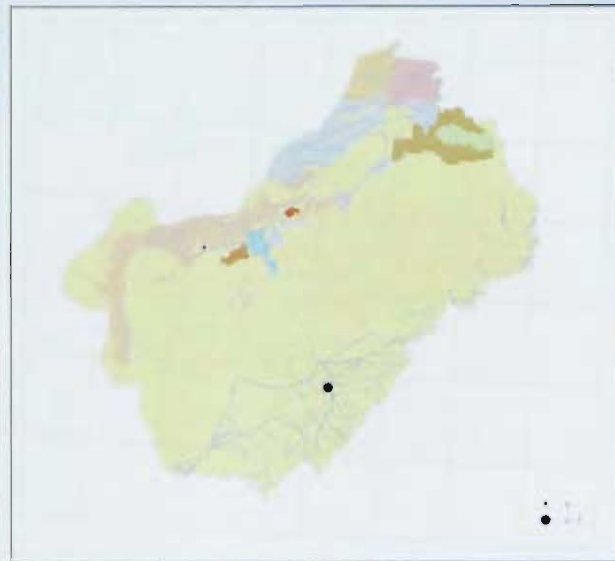
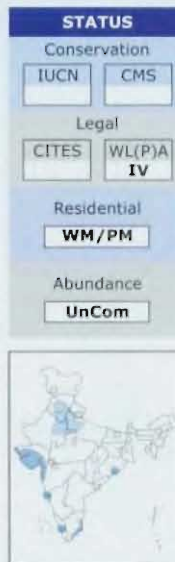
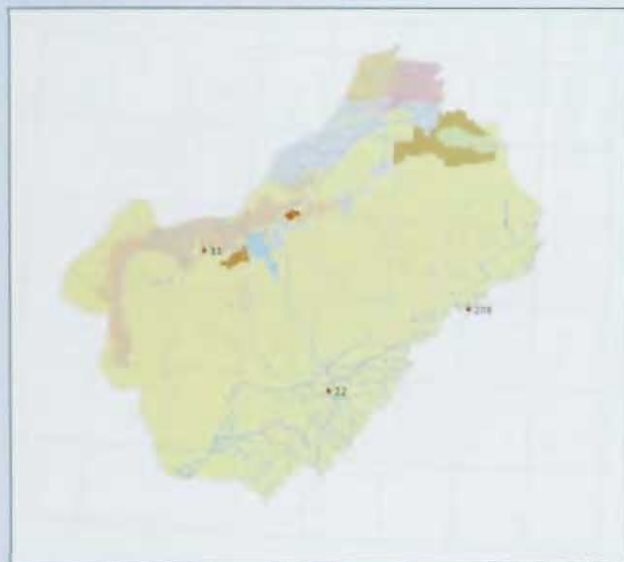


Diagnostics: Sparrow +; 16-19 cm; C; **Adult:** Sexes alike. Forehead brown; remaining upperparts pale sandy grey; black band from eye to beak; wings long, narrow and pointed; tail white with a broad subterminal black band; underparts smoky brown tinged with rufous, except whitish lower breast and abdomen; legs and feet short and dark brown. **Juvenile:** Upper plumage scaly; throat and foreneck spotted with black. **Habitat:** Occurs around large rivers with shingle or sand banks, placid streams and lakes in Himalaya up to 1800 m, also coastal swamps. **Habits:** Gregarious, found in large flocks around rivers and lakes, crepuscular, feeds generally at dusk; breeds from February to April, Nests colonial, a shallow scrapes. **Voice:** Highpitched *tirrit, tirrit, tirrit*. **Food:** Insectivorous feeds on beetles, bugs and termites. **Status and Distribution:** A locally common, resident but local migrant species almost in whole of India, moves to coastal areas in non-breeding season; Pakistan; Nepal; Bhutan; Bangladesh; Sri Lanka. N.W & C Indochina. **Threshold number:** 1,000.

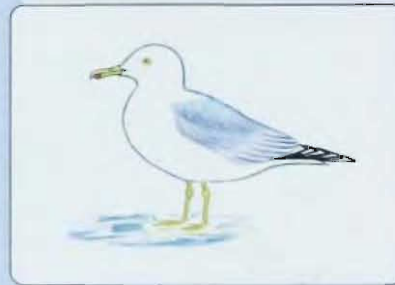


108. *Larus cachinnans* Pallas, 1811

Yellow-legged Gull

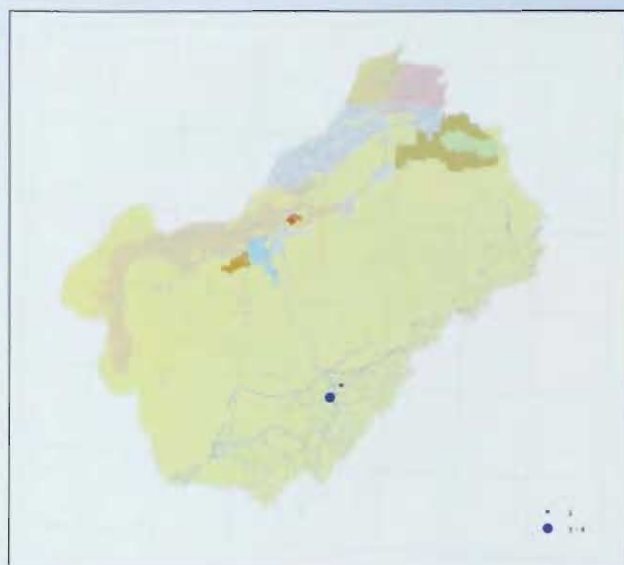
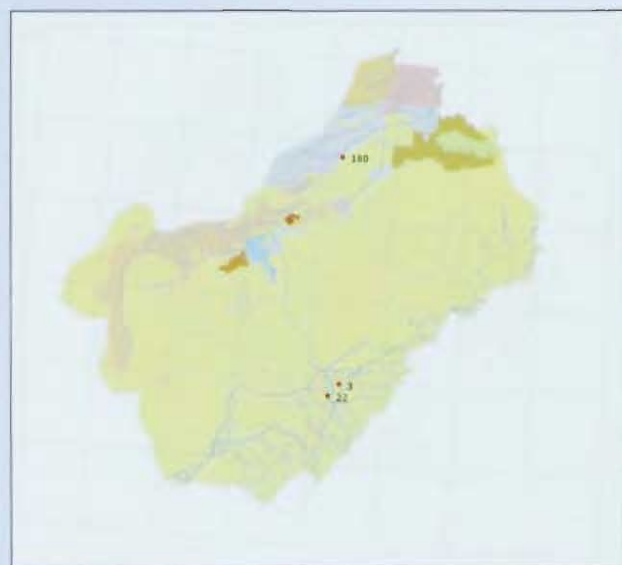


Diagnostics: domestic duck \pm ; 55-65 cm; C; Sexes alike; a large gull with long, dull yellow legs; yellow bill with red spot on lower mandible. *Adult:* similar to Heuglin's Gull in size and structure, but larger than Mew Gull and nearing Pallas's Gull. *Non-Breeding* (winter): With fine streaks on head may form faint mask around eyes that is usually retained longer on hind neck (prominent in early winter). Bill and legs duller or pinkish, former often with blackish sub terminal band. *Breeding* (summer): Upperparts grey, slightly paler than Pallas's; outer 6-8 primaries black with white tips, the black decreases inwards giving 'shutter' effect; outer primary with single large white 'mirror'; head, underparts and tail white; bill yellow with red gonys spot; legs usually yellow, occasionally pink. **Habitat:** Coasts, harbours, offshore waters also in passage in inland lakes, marshes and rivers. **Habits:** Often scavenge for fish waste and refuge in harbours; also wades in mudflats for feeding on Invertebrates; communal roosting on rocks. **Voice:** Loud harsh *kee-ow, kee-ow*, etc. **Food:** Carnivorous (fish waste, molluscs, crabs, also steals eggs and chicks of terns). **Status and Distribution:** Wide spread but uncommon winter migrant to India; Pakistan; Nepal; Bangladesh; Sri Lanka; Maldives. Breeds at Black Sea to Caspian & E Kazakhstan, winters in Black & Caspian Seas, SW Asia, NE Africa, Sri Lanka. **Threshold number:** 10,000

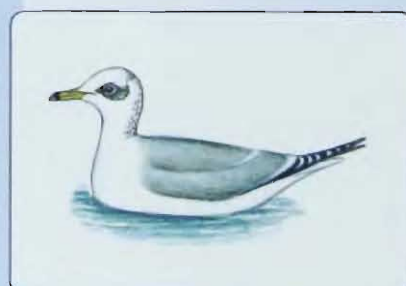


109. *Larus ichthyaetus* Pallas, 1773

Pallas's Gull

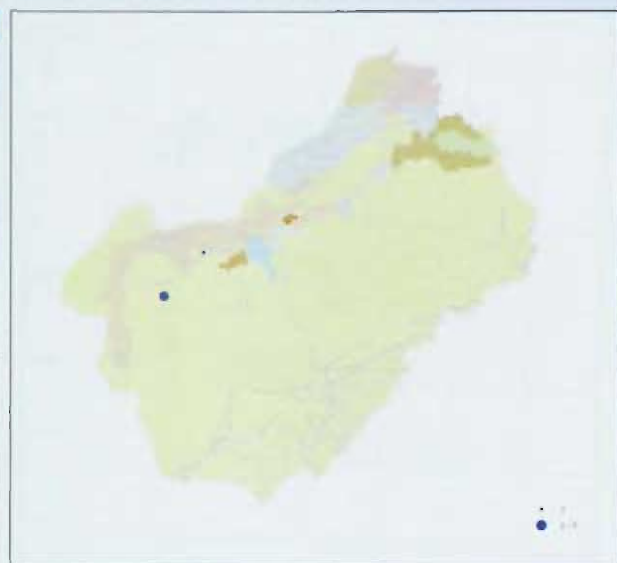


Diagnostics: Duck +; 66-72 cm; C; Sexes alike; largest gull in India, with robust bill; eyes dark; solitary. **Non-breeding** (winter): Head white with brown and black streaks across hind crown; white-tipped primaries sunterminally black. Bill stout, yellow with an orange tip banded with black. **Breeding** (summer): Head and upper neck black with two crescent white patches (one above and one below eye); bill stout, yellow with an orange tip banded with black; mantle pearl-grey with slaty tinge, remaining plumage pure white; primaries mainly white, the outer ones with sub terminal black bands and white tips; **legs** and feet yellowish-green. **Habitat:** Generally at coasts, and at sea around fishing boats, occasionally at large inland lakes, large rivers, and river barrages as winter or passage migrant. **Habits:** Solitary, only rarely in small loose flocks, swims by sitting on water. Scavenger and often indulge in piracy; flight steady. **Voices:** Loud harsh kraa-a, though seldom in winter. **Food:** Carnivorous (chiefly fish and crustaceans). **Status and Distribution:** A widespread and locally common winter migrant along Indian coasts, rare inland winter/ passage migrant on large rivers and lakes; Pakistan; Nepal; Bhutan; Bangladesh; Sri Lanka; Maldives. Breeds in C Asia E to L Balkash, S to Tibet, winters along the coasts of south Asia. **Threshold number:** 1,000.



110. *Larus brunnicephalus* Jerdon, 1840

Brown-headed Gull

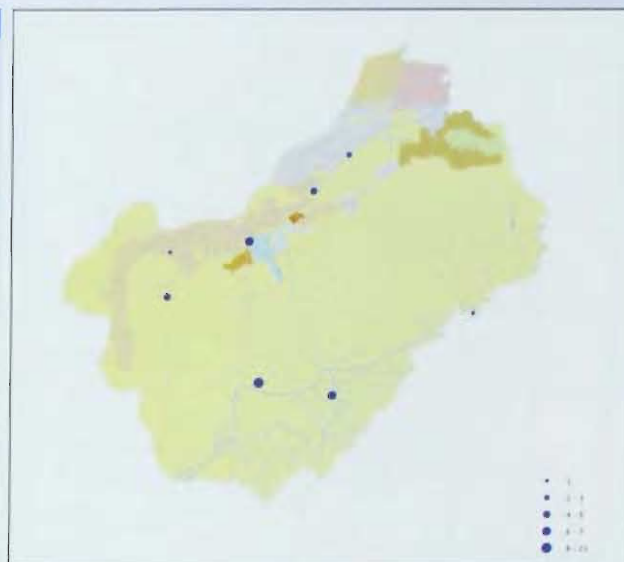


Diagnostics: Jungle Crow \pm ; 42-46 cm; C; Sexes alike. Medium-sized gull with a white patch (mirror) near the tips of black primaries; deep red bill, legs and feet. *Non-breeding* (winter): Head white with a vertical black crescent mark on ear-coverts. *Breeding* (summer): Head dark brown; remaining upperparts grey except white tail; underparts white. **Habitat:** Found inland at most large rivers and lakes as passage migrant during winters. **Habits:** Gregarious, scavenger on sea generally feeds and roosts with Pariah and Brahminy kites and Black-headed Gull. **Voice:** A loud harsh kyaaar. **Food:** Carnivorous, on Carcass and fish waste, prawns on seaboard, inland on insects, worms, grubs, slugs and also shoots of various crops. **Status and Distribution:** Biome Restricted species. A winter migrant mainly along the Indian coasts, uncommon inland, mostly as passage migrant along large rivers and lakes; Pakistan; Nepal; Bhutan; Bangladesh; Sri Lanka; Maldives. Breeds in high plateaus of SC Asia (also breeds in Ladakh between 3000-4500 m), winters on coasts S and SE Asia & W to Arabian Peninsula. **Threshold number:** 1,000.



111. *Larus ridibundus* Linnaeus, 1766

Black-headed Gull

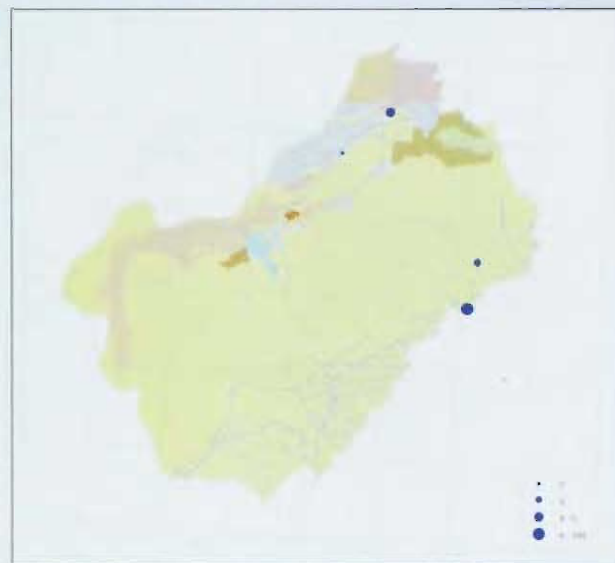


Diagnostics: House Crow \pm ; 38-43 cm; C; Sexes alike. Very similar to Brown-headed Gull, but distinguishable in all seasons by white leading edges to wings instead of white 'mirror'. **Habitat:** Seacoasts, harbours, estuaries, large rivers and inland jheels and lakes during winter. **Habits:** Gregarious, often in company of Brown-headed Gull, Pariah and Brahminy kites. **Voice:** A loud harsh *kree-ah*. **Food:** Carnivorous (fish, prawn, crabs and carcass on seaboard, insects etc. inland like Brownheaded Gull). **Status and Distribution:** A regular winter migrant along the coasts of India, though more common on western coast, passage migrant along inland rivers and lakes; Pakistan; Nepal; Bangladesh; Sri Lanka; Maldives. Breeds in Russia, C Asia, winters in S Asia.



112. *Gelochelidon nilotica* (Gmelin, 1789)

Gull-billed Tern

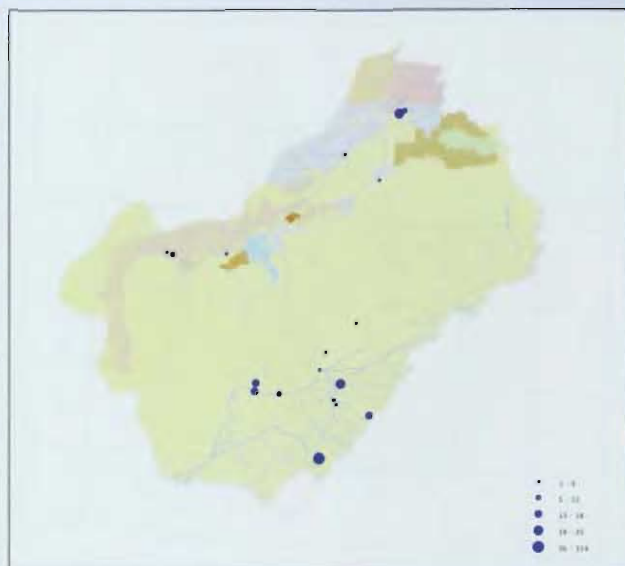


Diagnostics: House Crow ~; 35-38 cm; C; *Adult:* Sexes alike. Pale grey and white tern, with stout black 'gull-like' bill, slightly forked white tail and black legs. *Non-breeding* (winter): Head white streaked with black in front and behind the eyes. Distinguished from Whiskered Tern by larger size, stouter bill and slower wing beats. *Breeding* (summer): Head turns jet-black covering forehead, crown down to eyes and nape. *Juvenile:* Crown grey or greyish-white; upperparts pale brown with buffish edges and grey-brown primaries. **Habitat:** Coastal mudflats, saltpans, tidal creeks, brackish laeks, large inland rivers, jheels, marshes and cultivations. **Habits:** Gregarious, but generally seen in singles or twos in association with other terns near wetlands, flying low over sand-mudflats, swooping down frequently for foraging. Breeds from end April to June end, nests on sandbanks in rivers and on islands in lakes or jheels in West Bengal, Chilika lake. **Voice:** Generally silent, low gek-gek-gek. **Food:** Carnivorous, chiefly san crabs, prawns, crustaceans, fish, small frogs and insects. **Status and Distribution:** Mainly a widespread and locally common winter migrant along the coasts of India; Pakistan; Nepal; Bangladesh; Sri Lanka; Maldives. Breeds in C Asia (also in W Bengal, and Chilika Lake in Orissa), winters in S Asia. **Threshold number:** 1,000.



113. *Sterna aurantia* J.E.Gray, 1831

River Tern

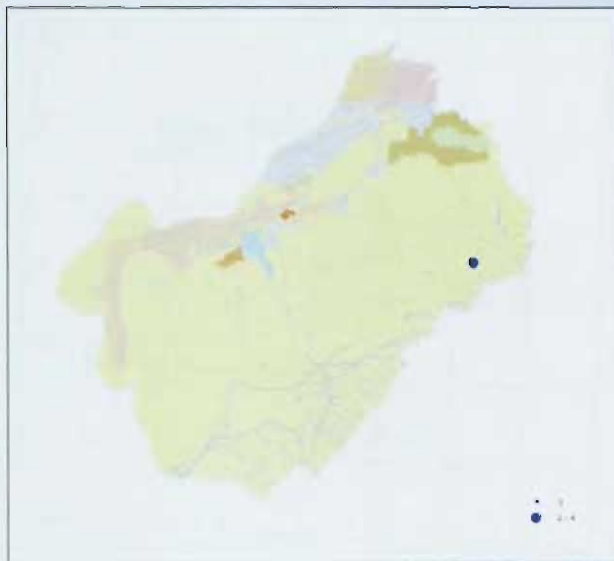
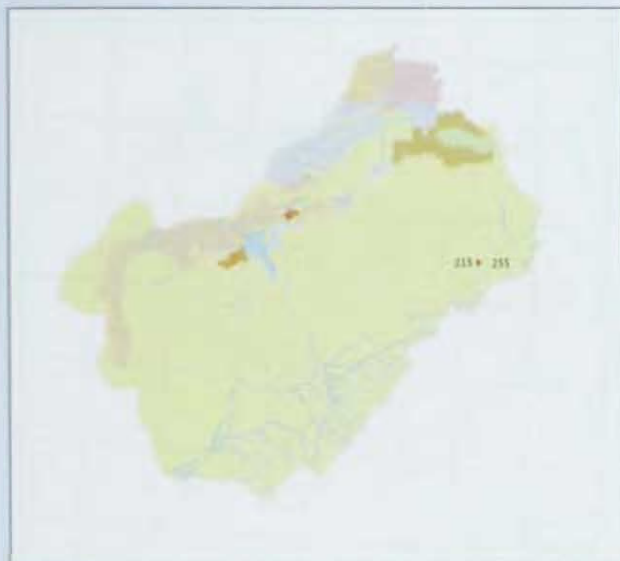


Diagnostics: House Crow #: 38-46 cm; C; *Adult:* Sexes alike. A fluviatile pale grey and white bird with pointed bright yellow bill; deeply forked 'swallow' tail; and short red legs. *Non-breeding* (winter): Head dull grey with streaks; bill duller with black tip. *Breeding* (summer): Forehead, crown and nape down to below eyes glossy jet-black; a horizontal crescent white patch below eyes; upperparts blue-grey; underparts white. *Juvenile:* With white forehead and broad supercilium; buffy white edged and blackish sub edged upperparts. **Habitat:** Affects large rivers, lakes, canals and tanks. **Habits:** Generally solitary, also found in twos and threes, flies in flocks up and down over rivers and lakes for foraging, feeds by plunging from a height with wings pulled in, roosts at night on sandbanks. Breeds in colonies from November to August, varying locally; nests a shallow depression on bare sand and rock, also islets in rivers. **Voice:** High pitched and melodious *kiuk-kiuk*. **Food:** Carnivorous (frogs, fish, crustaceans and aquatic insects). **Status and Distribution:** A widespread locally common resident species in the plains of India except Himalaya, uncommon in south; Pakistan; Nepal; Bhutan; Bangladesh. Breeds in S Asia. **Threshold number:** 1,000.



114. *Sterna albifrons* Pallas, 1764

Little Tern



Diagnostics: Myna \pm ; 22-24 cm; C; **Adult:** Sexes alike. A small grey and white tern. **Non-breeding (winter):** Forehead, crown and nape black mixed with white; bill blackish; legs and feet dusky red. **Breeding (summer):** Forehead white, crown and nape velvety black; bill and legs orange-yellow. **Juvenile:** Dark wavy bars on upperparts; white forehead and crown speckled brownish-black; blackish nape finely dotted with white. **Habitat:** Generally at inland rivers, jheels, lakes and reservoirs. **Habits:** Feeds solitary or in small flocks, flying back and forth over water surface scanning for food, plunges steeply over prey; also feeds by dipping. **Voice:** A sharp *creek, creek*. **Food:** Carnivorous, comprising chiefly small fish, crustaceans and aquatic insects. **Status and Distribution:** Resident in Gangetic Plains, during non-breeding season disperses along coastal areas; Pakistan; Nepal; Bangladesh; Sri Lanka; Maldives. Mostly breeds Gangetic Plains, Sri Lanka, Myanmar, Sumatra, Java, winters in Indian Ocean, along W coast of India, SE Asia. **Threshold number:** 1,000.



115. *Sterna acuticauda* J.E.Gray, 1831

Black-bellied Tern

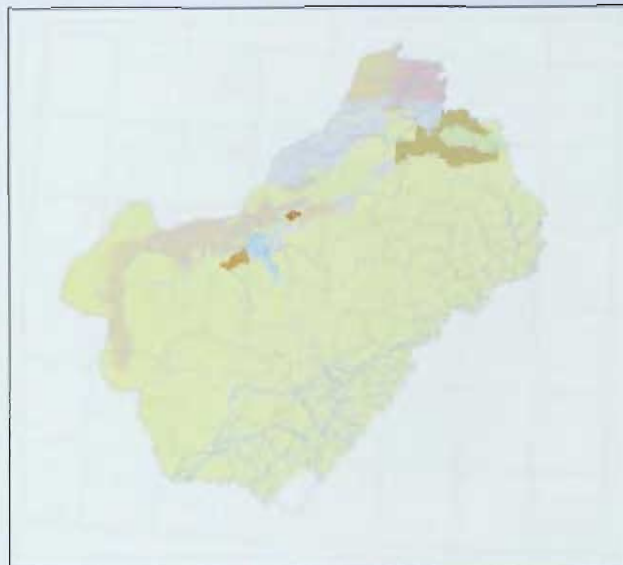
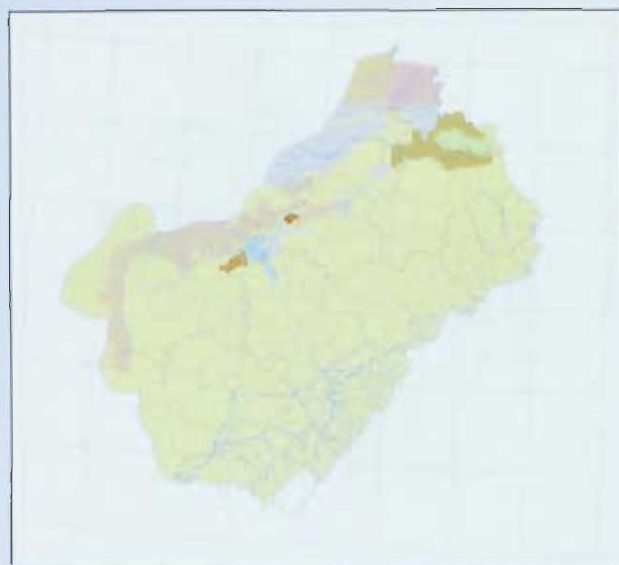


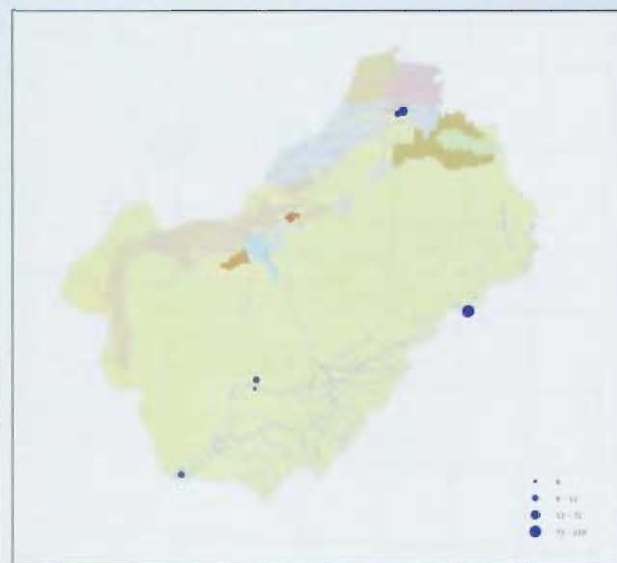
Photo: Khalid Rafeek

Diagnostics: House Crow -; 33 cm; C; **Adult:** Sexes alike. **Non-breeding** (winter): Head white streaked with black; a black patch behind eye; bill dull yellow with dusky tip; upper plumage greyish; under plumage white with grey tinge on foreneck and breast; tail deeply forked; legs orange-red. **Breeding** (summer): Forehead, crown down below to eyes and nape glossy black; lores, cheeks, chin and throat pure white; upper plumage ashy-grey; remaining under plumage black. **Habitat:** Predominantly inland freshwater tern, found at large rivers, wheels and lakes, etc. in winter. **Habits:** Gregarious, occurs in flocks flying up and down on tranquil stretches of rivers, or resting on shoals and sandbanks; feeds by swiftly plunging vertically from air and submerging in water or by scooping the prey from water or land. **Voice:** Clear piping *peuo*. **Food:** Carnivorous (fish, crustaceans and aquatic insects). **Status and Distribution:** Resident in almost whole of India, except NW, NE and Himalaya; Pakistan; Nepal; Bangladesh. SE Asia. **Remarks:** It is found on large rivers (usually breeding on sandpits and islands) and marshes, occasionally on smaller pools and ditches, in lowlands. Threats include the destruction of breeding habitat (islands and sandpits in larger rivers are increasingly cultivated), the collection of eggs for food, and natural or dam-determined flooding of nests. **Threshold number:** 250.



116. *Chlidonias hybridus* (Pallas, 1811)

Whiskered Tern

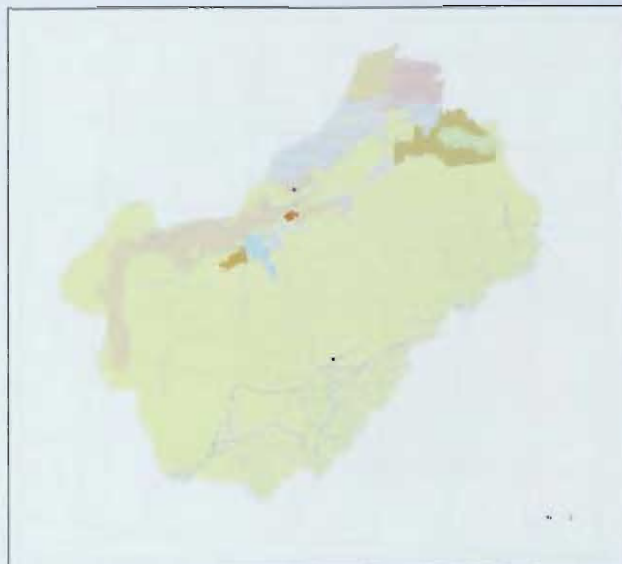


Diagnostics: Pigeon-; 23 cm; C; *Adult:* Sexes alike. A silvery-grey and white bird with long narrow pointed wings (tips projecting beyond tail) and short red legs. *Non-breeding* (winter): Forehead white with black streaks; head and nape black; plumage pale ashy; bill and legs blackish. *Breeding* (summer): Crown down to eyes and nape black with contrasting snow-white cheeks ('whiskers'); belly black; bill and legs dark red. *Juvenile:* Streaked brown and white. **Habitat:** Affects inland jheels, lakes, reservoirs, marshes, rivers and flooded paddy fields. **Habits:** Gregarious, often feeds in flocks, mostly forages on insects by capturing them from surface, sometimes plunges for fish. **Voice:** Sharp grating *kirreak-kirreak...* *kerk-kerk*. **Food:** Carnivorous, comprising fish, tadpoles, crabs and Odonata larvae. **Status and Distribution:** An uncommon winter migrant/passage migrant to India, breeds in Kashmir and Assam; Pakistan; Nepal; Bangladesh; Sri Lanka. Breeds in E Iran, Pakistan, N India, winters in S Asia. **Threshold number:** 1,000.



117. *Rynchops albicollis* Swainson, 1838

Indian Skimmer

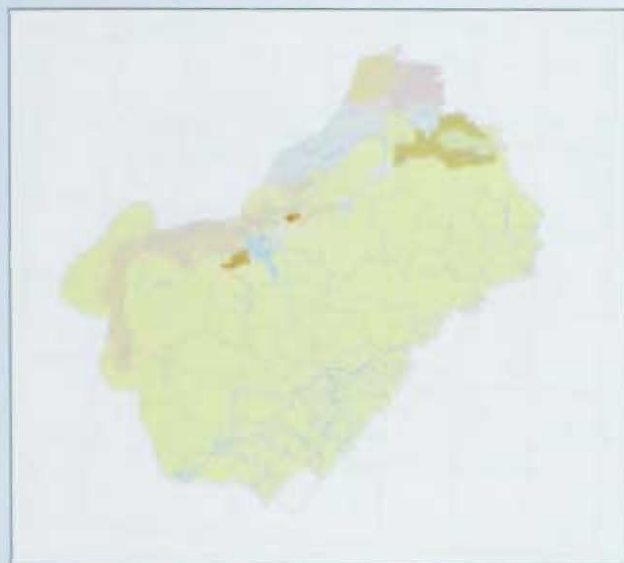


Diagnostics: House Crow \pm ; 40 cm; C; **Adult:** Sexes alike, but female slightly smaller. A large tern-like bird with contrasting pied plumage. Bill orange-red, yellow at tip and orange at base, with much longer lower mandible; forehead, neck-collar and wing-bar white; upperparts blackish-brown; underparts glistening white; legs and feet red. **Habitat:** Occurs in undisturbed reaches of large rivers with sandbanks, reservoirs, and lakes; occasionally coastal waters. **Habits:** Generally solitary, feeds in small flocks, roosts communally, hunts actively during moonlit nights, and gracefully skims over undisturbed waters ploughing with lower mandible held at oblique angle. **Food:** Carnivorous, comprising small fish. **Status and Distribution:** Resident, nomadic, mainly occurs on large rivers in Punjab and C India; Pakistan; Nepal; Bangladesh; Myanmar, SE Asia. Population has become very scarce recently, thus rarely seen in most parts of India, except Gujarat. **Remarks:** In the past century of increased human usage of wetlands, many colonies have been plundered and the substrates mined, cultivated and settled; and many feeding areas have been over-exploited, polluted, flooded or drained. The Indian Skimmer has consequently declined throughout and will continue to do so unless suitable wetland habitats, and particularly their colonies, are kept sufficiently free of disturbance and development. **Threshold number:** 60.



118. *Haliastur indus* (Boddaert, 1783)

Brahminy Kite



STATUS

Conservation

IUCN

CMS

Legal

CITES

WL(P)A

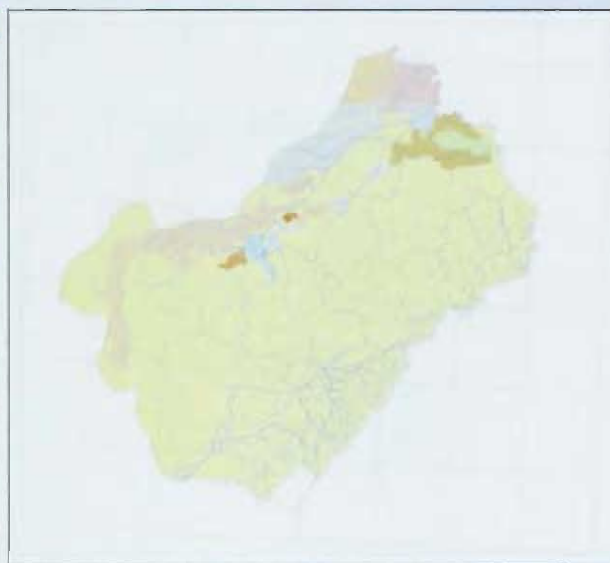
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Residential

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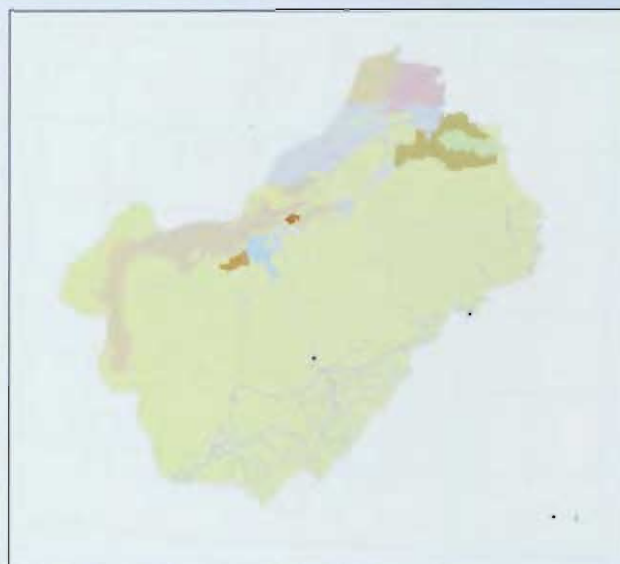
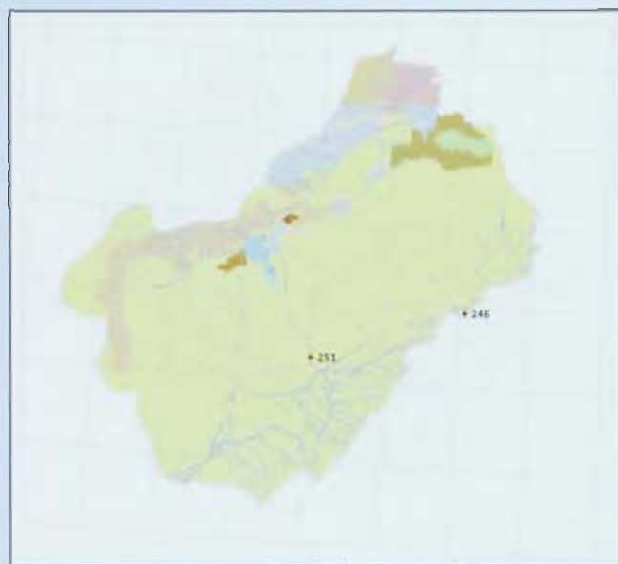


Diagnostics: Pariah Kite -: 48 cm; C; Sexes alike. *Adult* has bright chestnut and white plumage, and rounded tail. *Juvenile* is chocolate brown with pale bars across the upperwing. **Voice:** Short high-pitched scream. **Habitat:** Near around freshwater bodies, marshes, estuaries, and coastal waters. **Habits:** Often solitary or in pairs, but roost communally and gregarious where common. **Food:** Chiefly fish, frogs, crab and young ducks. **Status and Distribution:** Resident; undertakes local movements; widespread and locally common up to 1800 m in Himalayas; Pakistan; Nepal; Bangladesh; Sri Lanka; India to S China.



119. *Haliaeetus leucoryphus* (Pallas, 1771)

Pallas's Fish-Eagle

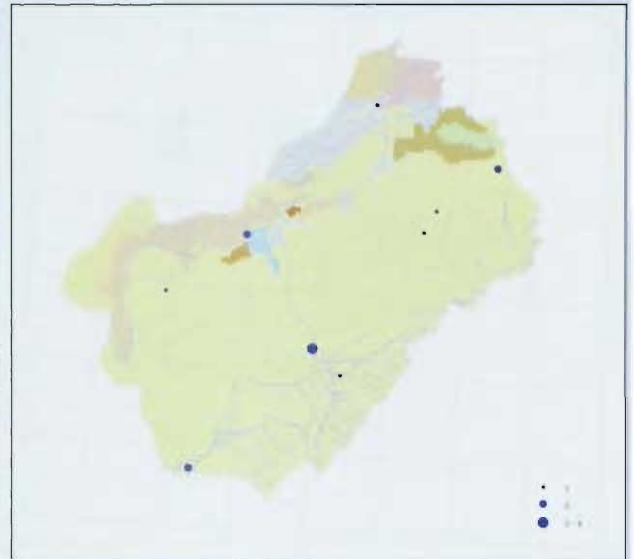


Diagnostics: Kite +; 75-84 cm; C; Sexes alike; female slightly larger. **Adult:** Dark brown with pale golden brown head, broad white band across tail conspicuous in flight. **Juvenile:** Dark brown with dark ear-coverts, paler and grayer underparts, and very dark wing quills and tail (unbanded). **Voice:** Loud, far-carrying raucous shrieks very like the creaking of the unrolled bullock cart. **Habits:** Rather sluggish, perching for long periods on a tree or sup port near water, feeds mainly on fish and ducks; breeds near lakes. **Habitat:** Pallas's Fish-eagle frequents areas close to freshwater lakes and rivers; It is generally absent from coasts, tidal creeks or mangroves. **Food:** Chiefly fish, also waterfowls/waterbirds, snakes, frogs and turtles. **Status and Distribution:** *Globally threatened/Vulnerable*. Resident, rare; from Kashmir east to NE India and south to SE Rajasthan, and Madhya Pradesh, SE Orissa and Gujarat; Pakistan; Nepal; Bhutan; Bangladesh.



120. *Circus aeruginosus* (Linnaeus, 1758)

Western Marsh-Harrier

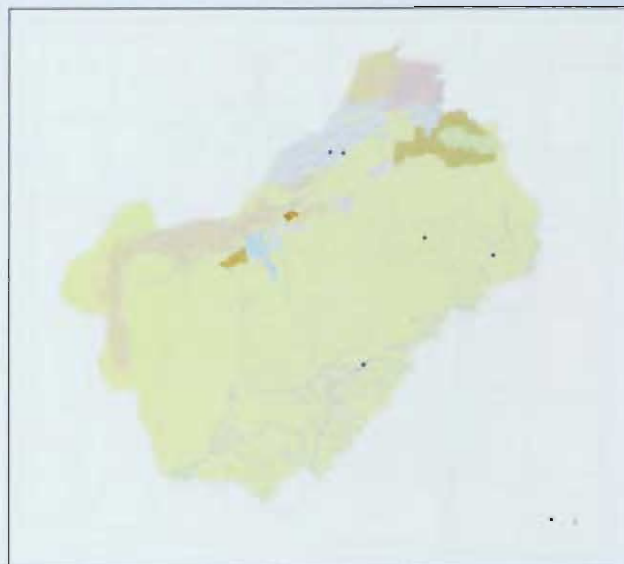
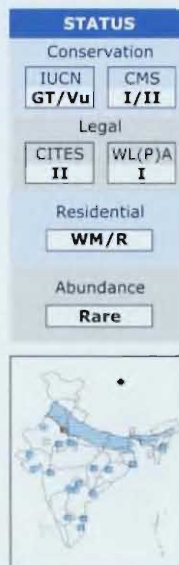


Diagnostics: Kite -; 54-59 cm; **Male:** Has pale head, grey upperwings with black tips, brown greater coverts and creamy leading edge. **Female:** Chiefly dark brown with creamy head and leading edge. **Juvenile:** Entirely dark with pale head and throat. **Voice:** Very silent. **Habitat:** Reedbeds, marshes, lakes, flooded paddy fields and coastal lagoons. **Habits:** Solitary spends time near marshland and Jheels. **Food:** Frogs, fish, weak birds, lizards, field mice and voles and large insects. **Status and Distribution:** Locally common and widespread winter migrant up to 2000m, mainly in plains in India; Pakistan; Nepal; Bhutan; Bangladesh; Sri Lanka; Maldives.



121. *Aquila clanga* Pallas, 1811

Greater Spotted Eagle

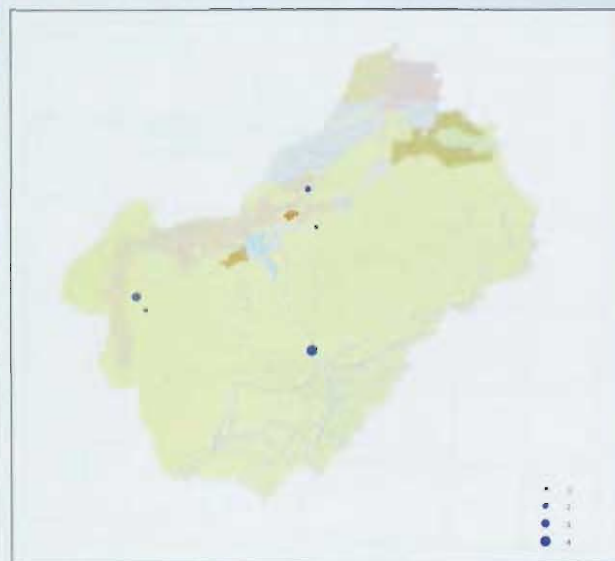


Diagnostics: Kite +; 64-72 cm; Sexes alike; female larger. **Adult:** A dark eagle with purplish wash on back; paler below; shorter and more rounded tail; black tipped slaty-blue bill; yellow cere; large round nostrils; dull yellow legs and feet. **Juvenile:** with white trailing edge to the wings and tail; white spots on the coverts and scapulars from white bars on the wings in flight. **Voice:** Wild clanging *jeb-jeb-jeb*. **Habitat:** Large lakes, wheels, canals, marshes and mangroves. **Habits:** Usually perched singly high on treetop, stump and canal banks. Hunts on the ground, generally slow moving prey. **Food:** Frogs, fish, lizards and waterbirds. **Status and Distribution:** Globally threatened/Vulnerable. Rare winter migrant and very local breeder in Gangetic plains; Pakistan; Nepal; Bhutan and Bangladesh. **Remarks:** The species winters widely in India, especially in northern states but straggling down to the Palk straits adjacent to Sri Lanka. During migration and in winter, a variety of open habitats are visited, including deserts, shrub land, wetlands and mangroves. It has suffered from extensive habitat loss and persistent persecution. The decline of the species in India is attributed to "altering ecological conditions, natural or man-made", and in particular to reclamation of wetlands.



122. *Aquila nipalensis* Hodgson, 1833

Steppe Eagle

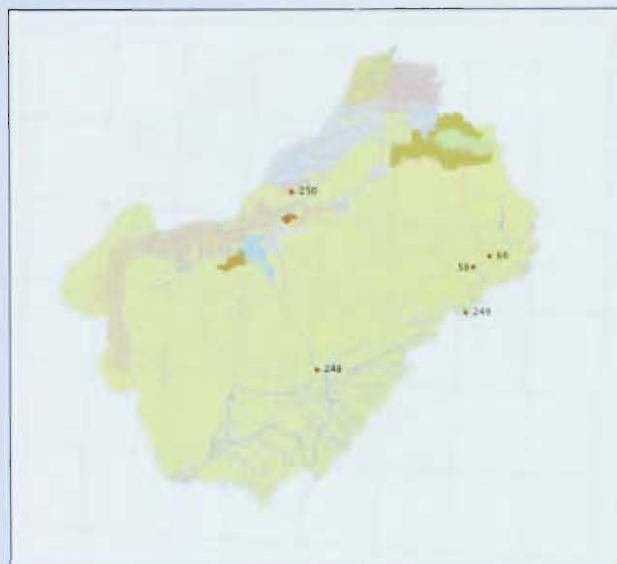


Diagnostics: Kite +; 76-80 cm; Sexes alike; female larger. **Adult:** A buffish brown eagle with a rufous patch on nape; usually two pale bars on upper and under side of wings; and distinct barring on remiges. **Juvenile:** with a broad white bar across underwings; two white bars on upperwings; and white crescent across upper tail-coverts. **Voice:** Unrecorded/ undescribed. **Habitat:** Wooded hills and large lakes. **Habits:** Spends much time on treetops near rubbish dumps or slaughterhouses. Feeds on carrions and refuse. **Food:** Apart from carrions, feeds on lizards, birds and rodents. **Status and Distribution:** A locally common widespread winter migrant in India; Pakistan; Nepal; Bhutan and Bangladesh.



123. *Aquila heliaca* Savigny, 1809

Eastern Imperial Eagle



STATUS

Conservation

IUCN	CMS
GT/Vu	I/II

Legal

CITES	WL(P)A
I	IV

Residential

WM

Abundance

Rare

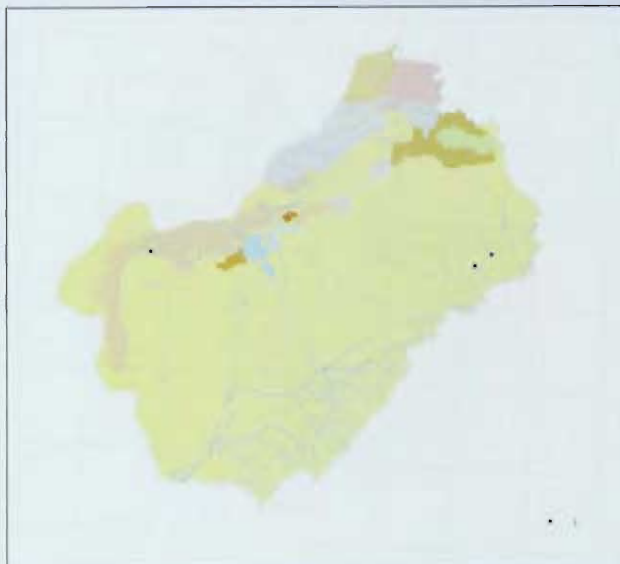
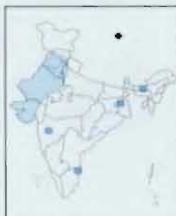


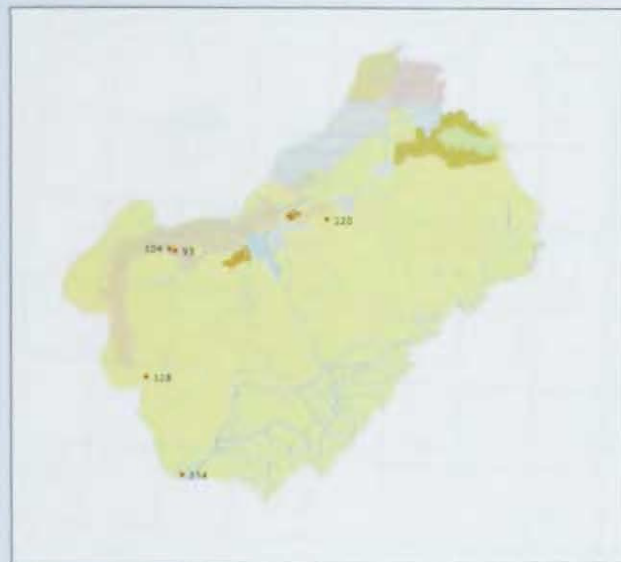
Photo: Claudevare Aurelien

Diagnostics: Vulture -; 81-90cm; Sexes alike; female larger. **Adult:** A large dark eagle with pale head and whitish shoulders. **Juvenile:** with streaked buffish plumage. **Voice:** Quick barking owk-owk-owk. **Habitat:** Around major lakes and wetlands, open country in plains. **Habits:** Sluggish and solitary; Spends time perching on treetops and on the bare ground. Largely feeds on carrion. Flights slow and heavy like a vulture. **Food:** Apart from carrions, feeds on lizards, birds and rodents. **Status and Distribution:** Globally threatened/Vulnerable. Rare, winter migrant to NW India; Pakistan; Nepal; Bangladesh. **Remarks:** Early reports suggest that the species was patchily common in India, especially in the plains of Uttar Pradesh and Gujarat, but apparently rare in the lowlands from Bihar eastwards. The important Imperial Eagle population in north-west India appears to have declined in the late 1990s. **Threats:** Despite the huge range of this eagle, its population has declined significantly everywhere as a consequence of changing land-use practices, pesticides, persecution and declining prey. Its long-term survival will depend on the protection of sufficient natural habitat, especially in the breeding range, and control of hunting, particularly in the wintering range. **Legislation:** The Imperial Eagle is listed on Appendix I of the CMS. It is also listed on Appendix I of CITES. It is legally protected in India.



124. *Pandion haliaetus* (Linnaeus, 1758)

Osprey



STATUS

Conservation

IUCN

CMS

II

Legal

CITES

WL(P)A

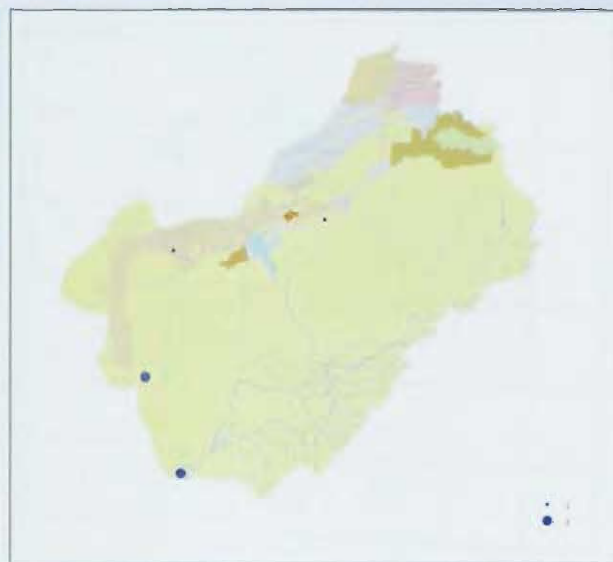
I

Residential

WM

Abundance

UnCom

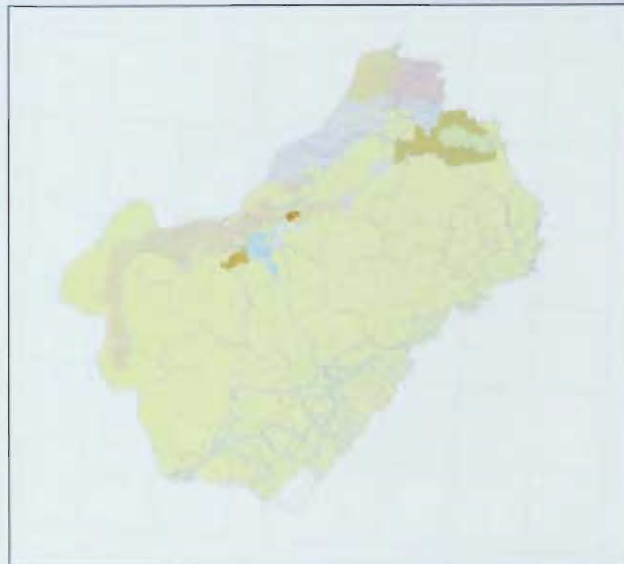
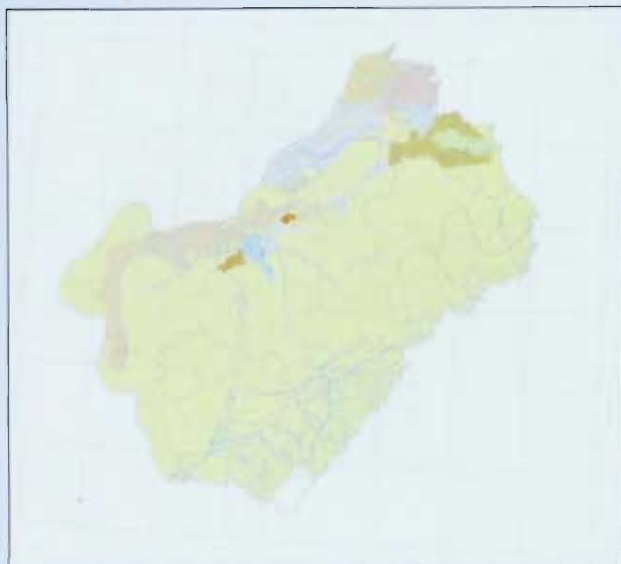


Diagnostics: Kite -; 55-58 cm; C; Sexes alike. **Adult:** Head white with dark brown band through the eye; white underbody and under wing-coverts with black carpal patch. **Juvenile:** Similar to adult but has buff tips to upperparts, including coverts; rusty breast band prominent in adult is poorly defined. **Voice:** A short cheeping whistles *kai, kai, kai*. **Habitat:** Major rivers, reservoirs, lakes, sheels, coastal lagoons and estuaries. **Habits:** Usually solitary frequently perches on dead trees in vicinity of wetlands. Feeds on fish. **Food:** Chiefly fish. **Status and Distribution:** Mainly winter visitor, from September to March throughout the subcontinent. Breeds in Himalayas in Ladakh, Kashmir and Uttaranchal between 2000-3300m altitude; Pakistan; Nepal; Bhutan; Bangladesh; Sri Lanka; Maldives; almost cosmopolitan.



125. *Falco prergrinus* Tunstall, 1771

Peregrine Falcon



Diagnostics: Kite -; 38-48 cm; C; Sexes alike; female larger. **Adult:** Prominent slaty-black head; grey upperparts barred with blackish; black cheek stripes contrasting with white chin and throat. **Juvenile:** Dark brown above and darkest on head; rufescent white below. **Voice:** Hoarse kwaeb, kek-kek, chirr-r-r. **Habitat:** Winters near large lakes, rivers and marshes. **Habits:** Seen singly or in pairs; feeds on waterfowl, pigeons, partridges and other birds; preys actively at dawn and dusk. **Food:** Chiefly hunt on winter waterbirds. **Status and Distribution:** Widely spread but uncommon resident upto lower Himalaya, undertakes altitudinal movements, winters in Indus plains in Pakistan and plains of N India; Pakistan; Nepal; Bhutan; Bangladesh; Sri Lanka; Maldives. Almost cosmopolitan.



126. *Alcedo atthis* (Linnaeus, 1758)

Small Blue Kingfisher



STATUS

Conservation

IUCN

CMS

Legal

CITES

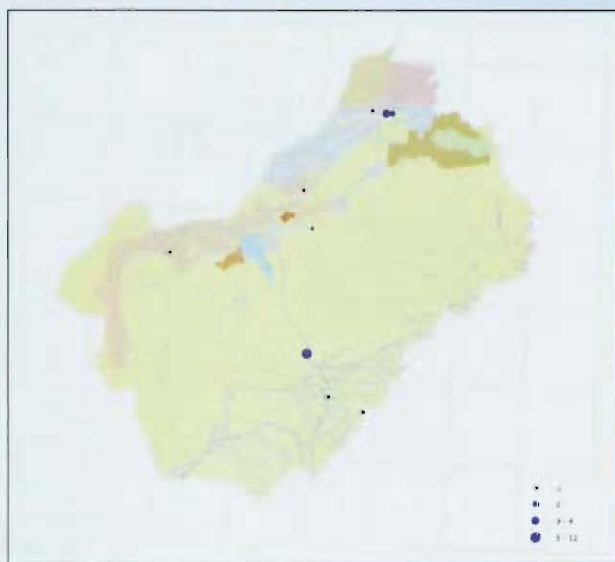
WL(P)A
IV

Residential

R

Abundance

Com

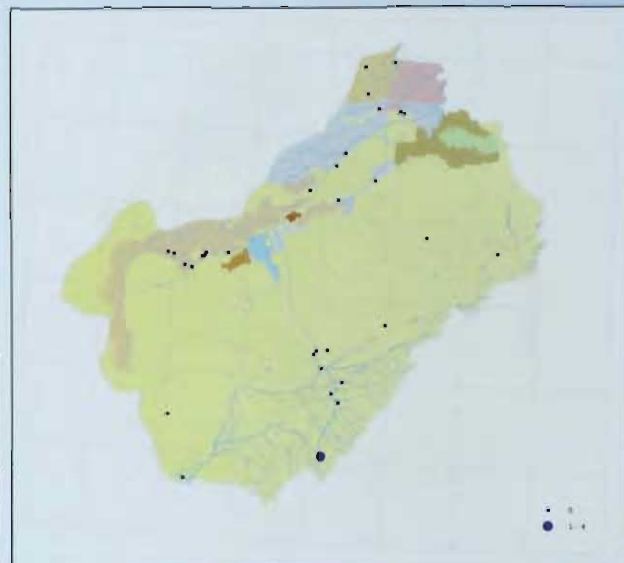


Diagnostics: Sparrow +; c.18 cm; C; Sexes alike. Brilliant turquoise-blue and orange kingfisher; blue green above, deep rust below; white neck patch; rusty-red ear-coverts; short stumpy tail and long, straight pointed bill. **Voice:** Piping *chee, chichee*. **Habits:** Perches around 1-2 m at a vantage point on a perch, plunges headlong into the water to catch prey. **Habitat:** Streams, canals, ditches, ponds, rivers and lakes in open country. **Status and Distribution:** Resident, common up to 2000m almost throughout India; Pakistan; Nepal; Bhutan; Bangladesh and Sri Lanka.



127. *Halcyon smyrnensis* (Linnaeus, 1758)

White-breasted Kingfisher

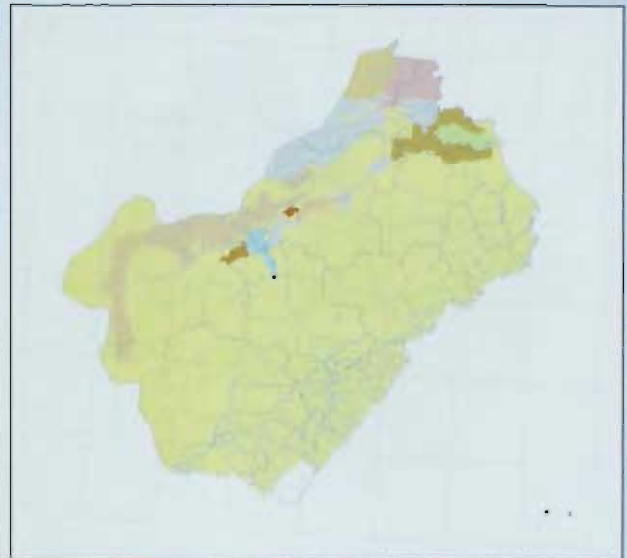


Diagnostics: Myna +; c. 28 cm; C; Sexes alike. A large Kingfisher has large red bill, chocolate-brown head and under parts except white throat and centre of breast; brilliant turquoise-blue upperparts, rump and tail. In flight, the bold white wing-patch is the diagnostic. **Voice:** Loud ke-ke-kek-kek-kek-kek in flight. **Habitat:** Varied, often ranging away from water; streams, rivers, canals and village tanks. **Habits:** Characteristically perches on telegraph/phone wires, poles and branches; bold and noisy. **Status and Distribution:** Resident, subject to local movements, common from plains up to 2250m in India; Pakistan; Nepal; Bhutan; Bangladesh; Sri Lanka, SE Asia.



128. *Halcyon pileata* (Boddaert, 1783)

Black-capped Kingfisher

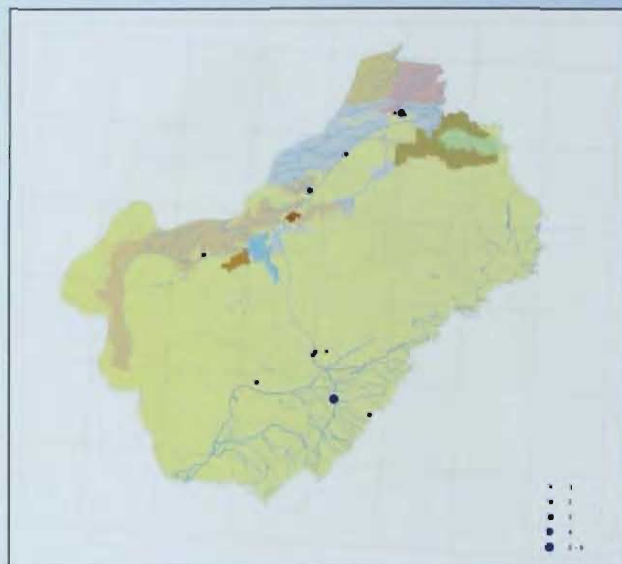


Diagnostics: Myna +; c. 30 cm; C; Sexes alike. Mainly a coastal kingfisher has coral-red bill, purple-blue upperparts and tail, and pale rusty under parts. In flight, the large white wing-patch is conspicuous. **Voice:** Distinctive ringing cackle, *kikikikikiki*. **Habitat:** Coastal areas including mangrove swamps, estuaries, tidal creeks and rivers. **Habits:** Perches on open edges of mangroves, forests and telegraph/phone wire. Dives down obliquely, rarely plunges into water. **Status and Distribution:** Resident, shows local movements and locally common on coasts in India; Pakistan; Nepal; Bangladesh; Sri Lanka. E Asia.



129. *Ceryle rudis* (Linnaeus, 1758)

Lesser Pied Kingfisher

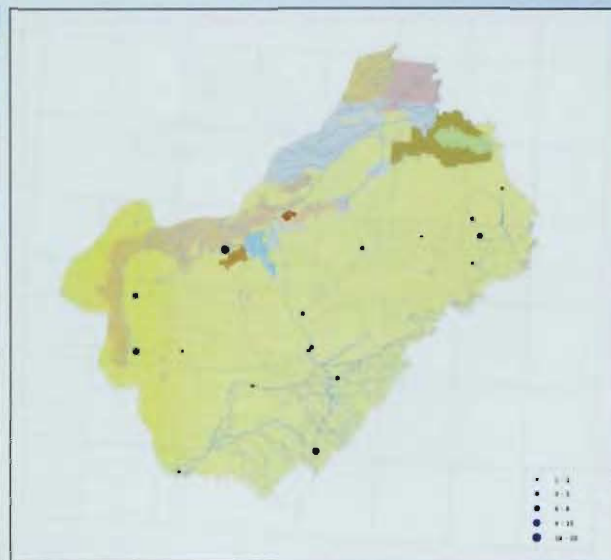
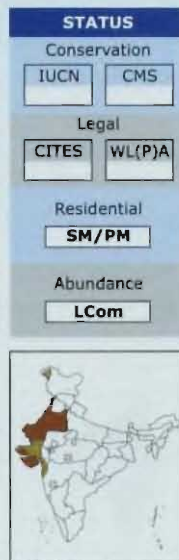


Diagnostics: Myna +; c. 31 cm; C; Male: A black and white Kingfisher with small crest; black band through eye with broad white supercilium; upperparts blotched with black; white underparts with black breast-band. **Female:** Similar to male but has single, usually broken breast-band. **Voice:** High chirrik-chirrik **Habitat:** Ponds, lakes, canals, irrigation tanks, flooded ditches, jheels, slow- running streams and rivers; sometimes also tidal creeks and intertidal pools. **Habits:** Has a very characteristic habit of hunting by hovering over water with bill pointing down and fast beating wings; plunges vertically downwards to catch the fish. **Status and Distribution:** Resident, common throughout India below 1800m; Pakistan; Nepal; Bhutan; Bangladesh; Sri Lanka. SE Asia,



130. *Merops persicus* Pallas, 1773

Blue-cheeked Bee-eater

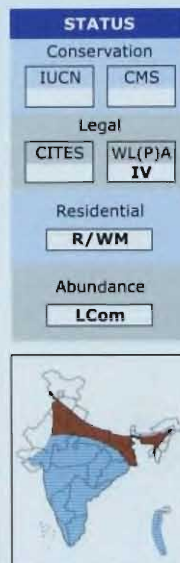


Diagnostics: Bulbul ±; 24-26 cm; C; Sexes alike. **Adult:** Has chestnut throat and yellow chin; bronze-green tail whitish forehead and turquoise-and-white supercilium; pure green upper and underparts. **Juvenile:** Has diffuse pale fringes to upper and underparts. Lacks blue on supercilium and cheeks. **Voice:** Liquid trilling *prreeew*. **Habitat:** Near jheels, irrigation tanks, reservoirs, canals and sandy seashores. **Habits:** Keeps in loose flocks when foraging. Perch on exposed telegraph wires. Hawks insects in continuous flight; roosts communally in trees, outside breeding season. **Food:** Dragonflies, damselflies, bees, wasps and other flying insects. **Status and Distribution:** Summer migrant as well as passage migrant, locally common in NW India; Pakistan. SW Asia.



131. *Merops philippinus* Linnaeus, 1766

Blue-tailed Bee-eater



Diagnostics: **Bulbul** \pm ; **23-26 cm**; **C**; **Sexes** alike. **Adult:** Blue rump and tail, green forehead and supercilium are the diagnostics. **Juvenile:** With strong blue cast to rump, upper tail-coverts and tail, and less defined rufous throat. **Voice:** Liquid trilling *prreeew*. **Habitat:** Near jheels, irrigation tanks, reservoirs, canals and sandy seashores; keeps close to water, but inhabits more wooded, less dry country. **Habits:** : Keeps in loose flocks when foraging. Perch on exposed telegraph wires. Hawks insects in continuous flight; roosts communally in trees, outside breeding season. Sometimes also hunts from treetops at forest edges. **Food:** Mainly dragonflies, wasps and bees. **Status and Distribution:** Resident as well as winter migrant, locally common in N and NE India; Pakistan; Nepal; Bangladesh; Sri Lanka and Maldives. SE Asia.



132. *Riparia riparia* (Linnaeus, 1758)

Sand Martin



STATUS

Conservation

IUCN

CMS

Legal

CITES

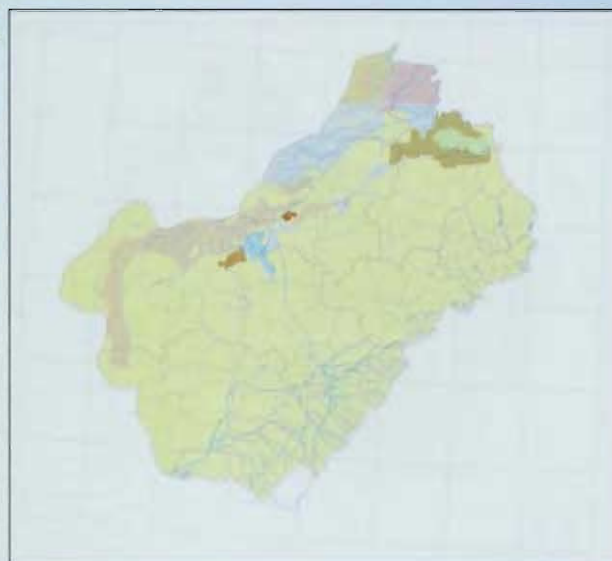
WL(P)A

Residential

R

Abundance

LCom

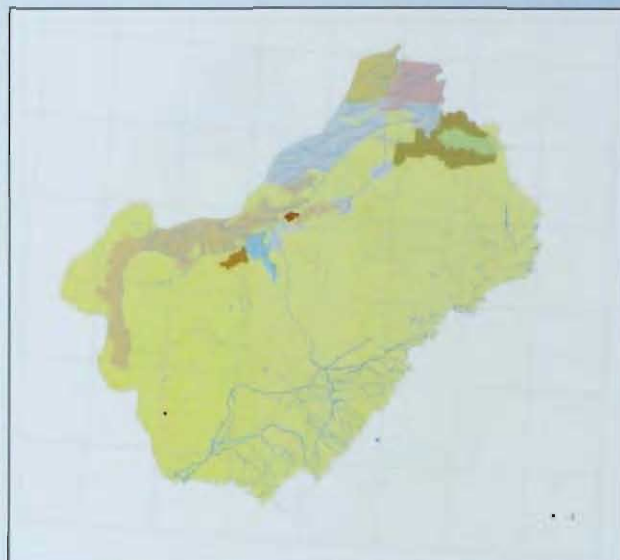


Diagnostics: Sparrow ~; 13 cm; Sexes alike, **Adult:** Similar to Pale Martin but with white throat and half collar; brown breast-band; darker brown upperparts; and deeper forked tail. **Juvenile:** with buff fringes to upperparts and buff tinge to throat. **Voice:** Pleasant twittering intermixed with rasping call. **Habitat:** Around streams and rivers with sandy banks. **Habits:** Usually feeds above water, sometimes also overland; often in flocks with swifts; active at dusk; forms large communal roosts in reedbeds. **Food:** Dipterans and small beetles. **Status and Distribution:** Resident as well as winter migrant, locally common; breeds in Assam, recorded also from Gujarat, Bihar, Manipur, Maharashtra in India; Nepal; Bangladesh and Maldives



133. *Riparia paludicola* (Vieillot, 1817)

Plain Martin



Diagnostics: Sparrow -; c. 12 cm; C; Sexes alike. **Adult:** Pale brownish-grey throat and breast, merges with drab white of under parts. **Juvenile:** Has rufous fringes to upperparts and throat. **Voice:** High-pitched twitter. **Habitat:** Near large rivers, streams and lakes with vertical sandy banks. **Habits:** Generally feeds over water, crepuscular; perches in rows on telegraph/phone wires, roosts communally in reed beds. **Status and Distribution:** Resident, common in N and C India from plains to 1500 m. Pakistan; Nepal; Bhutan; Bangladesh; Maldives.



134. *Hirundo rustica* Linnaeus, 1758

Common Swallow



STATUS

Conservation

IUCN

CMS

Legal

CITES

WL(P)A

Residential

WM

Abundance

LCom

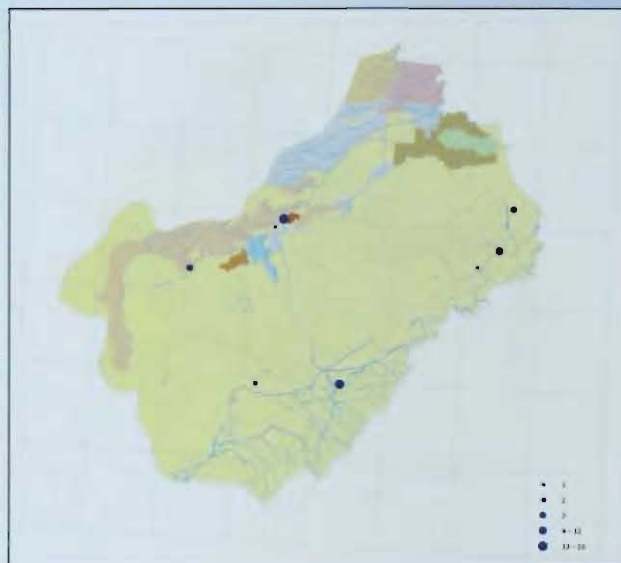
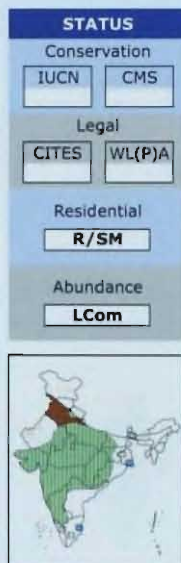
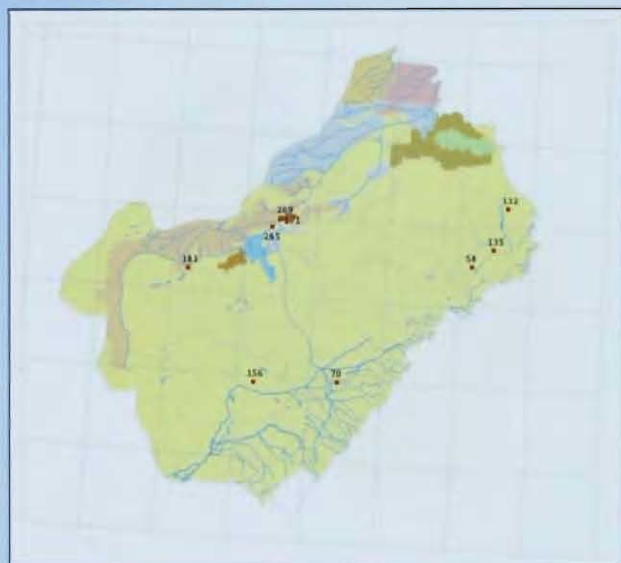


Diagnostics: Sparrow \pm ; c. 18 cm; C; Sexes alike. **Adult:** Rust-colored forehead and throat, long tail-streamers, blue-black breast band. **Juvenile:** Has orange-buff forehead and throat, breast-band is browner and less defined; upperparts duller; and shorter tail-streamers. **Voice:** Pleasant twittering and screeching; clear vit vit. **Habitat:** Open country lakes and rivers, generally near water in winter. **Food:** Chiefly midges, gnats and other dipterous insects. **Status and Distribution:** Resident and partial winter migrant, wide spread in winters; breeds from foothills up to 3000 m in Himalayas from N Pakistan east to Arunachal Pradesh; Pakistan; Nepal; Bhutan; Bangladesh; Sri Lanka, Maldives.



135. *Hirundo smithii* Leach, 1818

Wire-tailed Swallow

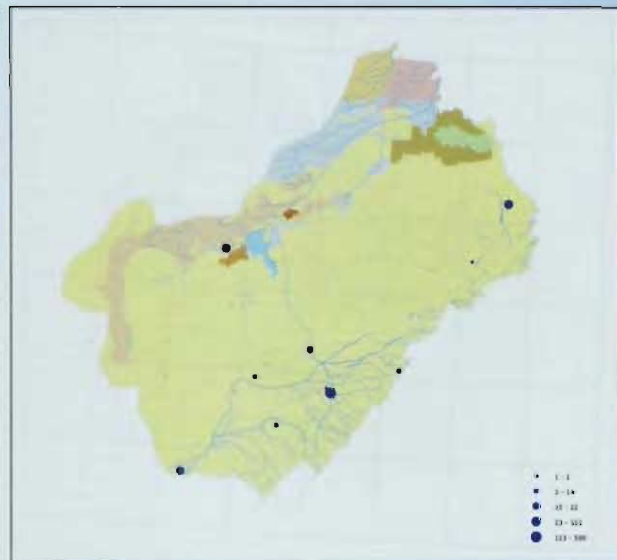
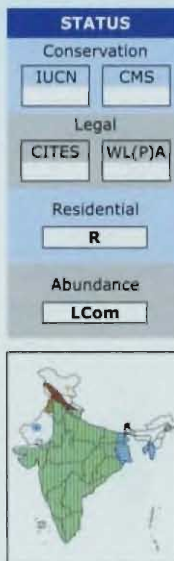


Diagnostics: Sparrow \pm ; c.14 cm; C; Sexes alike, but female with shorter tail-wires. **Adult:** Glossy steel blue above with bright chestnut cap; easily distinguished by bright pure white underparts and two long tail-wires. **Juvenile:** Has brownish cast to blue upperparts and dull brownish crown. **Voice:** Double chirik-weet, and chichip alarm call. **Habitat:** Open country, cultivations in the neighborhood of rivers, jheels, reservoirs, etc. **Habits:** Generally found in vicinity of water, sails in flocks over the water surface, usually feeds in pairs or loose flocks, roosts in reedbeds. **Status and Distribution:** Resident in peninsula undertakes summer migration to N India, up to 1500 m in the Himalayas in India; Pakistan; Nepal; Bangladesh; Sri Lanka



136. *Hirundo daurica* Linnaeus, 1771

Red-rumped Swallow

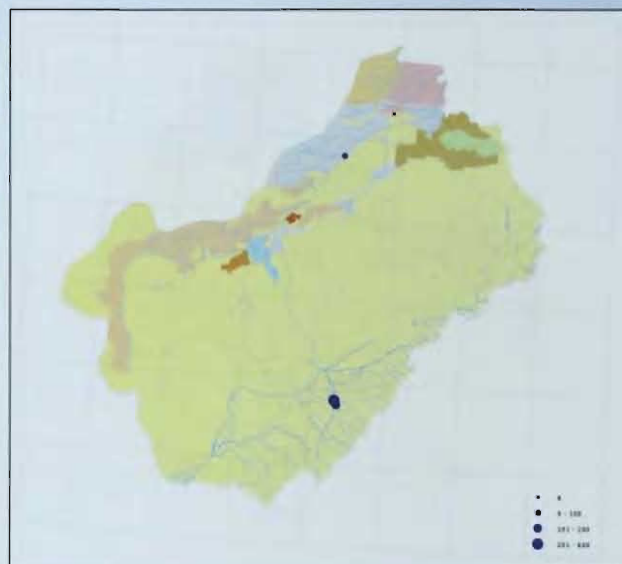


Diagnostics: Sparrow \pm ; 16-19 cm; C; Sexes alike. **Adult:** The Rufous rump (varies from white to chestnut) separates from all Swallows except Striated Swallow. Neck, sides and rump rufous-orange; upperparts glistening blue-black; underparts buffish-white, with fine streaks on throat and upper breast. **Juvenile:** Has less gloss to blue crown, mantle and wings; paler neck-collar and rump; buff tips to tertials; and shorter tail-streamers. **Voice:** A loud low-pitched cheer, a sparrow-like chirp, and a more nasal queenk. **Habitat:** in upland cultivation and on open grassy hill slopes during summer and in open scrub country, cultivation and forest clearings during winter. **Habits:** Gathers in huge numbers in winter and on migration, when frequently seen in close-packed flocks on telegraph wires, roosts communally in reedbeds. **Food:** Dipterans, Coleopterans, winged ants and termites. **Status and Distribution:** Resident, winters in plains, common summer visitor to mountain regions of W Himalayas up to 3300m, breeds between 1000 and 3300m in India; Pakistan; Nepal; Bhutan; Bangladesh; Sri Lanka



137. *Hirundo fluvicola* Blyth, 1855

Streak-throated Swallow

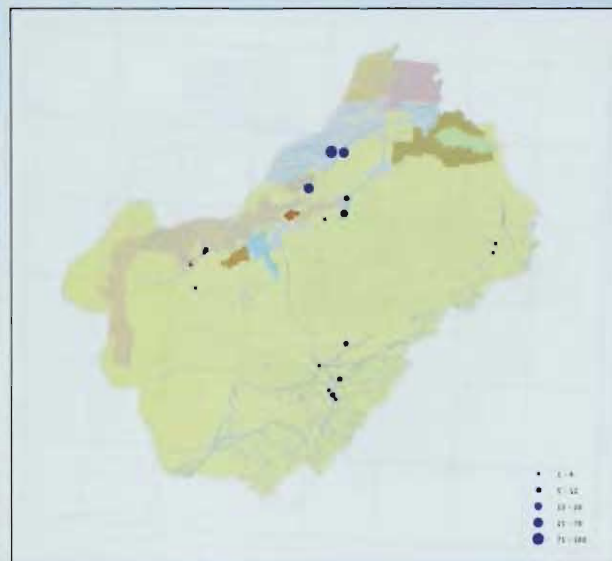


Diagnostics: Sparrow -; c. 12 cm; C; Sexes alike. **Adult:** Very slightly forked tail; glossy steel blue above with narrow white streaks on mantle; chestnut forehead and crown; brown streaking on chin, throat and breast; rump pale brown; fulvous white below. **Juvenile:** Has duller, browner crown, and brown-toned mantle and wings. **Voice:** Twittering chirp and sharp trr trr in flight. **Habitat:** Found in open country and cultivation in the vicinity of rivers, canals and reservoirs. **Habits:** Highly gregarious, forages in close proximity of water with other swallows. **Status and Distribution:** Resident, locally common in plains of N & SW India, breeds in plains and up to 700m in W Himalayas in India; Pakistan; Nepal; Bangladesh; Sri Lanka.



138. *Motacilla alba* Linnaeus, 1758

White Wagtail



Diagnostics: Bulbul; c. 18 cm; C; Sexes alike. **Adult:** Black and white head pattern, mantle grey or black, wing-coverts largely black. Considerable variations occur in breeding adults. **Juvenile:** with grey head, mantle and breast with whitish supercilium. **Voice:** Sharp *chi-cheep*. **Habitat:** Inhabits streams and rivers in hills during summer, winters in open country near marshes, rivers, streams, canals, lakes etc. **Habits:** Swiftly moves around wetlands and fields; wags its tail continually up and down. **Status and Distribution:** Resident with altitudinal and short-range movements; breeds in Himalayas (1500-5000m), widespread and common a winter migrant; India, Pakistan; Nepal; Bhutan; Bangladesh; Sri Lanka.



139. *Motacilla maderaspatensis* Gmelin, 1789

Large Pied Wagtail

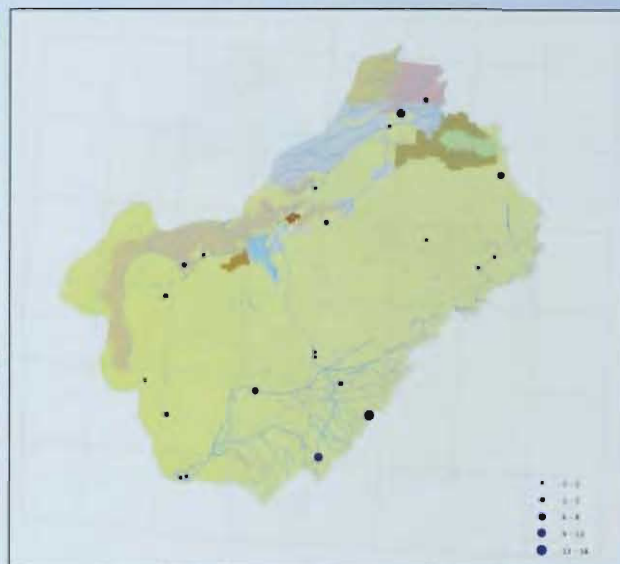
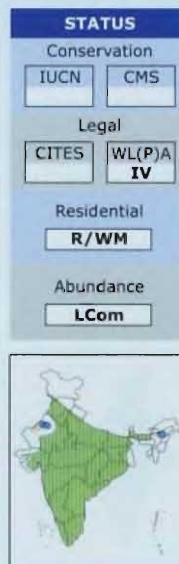


Photo: Vijay Cavale

Diagnostics: Bulbul; c. 21 cm; C; Sexes alike. **Adult:** A large Wagtail with black and white plumage that distinguishes it from all other wagtails, wing-coverts largely white, supercilium white. **Juvenile:** with brownish-grey head, mantle and breast, with white supercilium. **Voice:** Loud *chiz-zit*, chiefly uttered in flight. **Habitat:** Banks of rivers, canals, lakes and irrigation barrages. **Habits:** Usually keeps in pairs throughout the year. Generally sedate and confiding inhabits clear, rocky smooth running streams with grassy islands. **Food:** Beetles, locusts, dragonflies, snails and small seeds. **Status and Distribution:** Resident, locally common and widespread except NW & NE Himalayas (up to 1500m), up to 2200 m in peninsula; Pakistan; Nepal; Bhutan; Bangladesh; Sri Lanka.



140. *Motacilla citreola* Pallas, 1776

Citrine Wagtail



STATUS

Conservation

IUCN

CMS

Legal

CITES

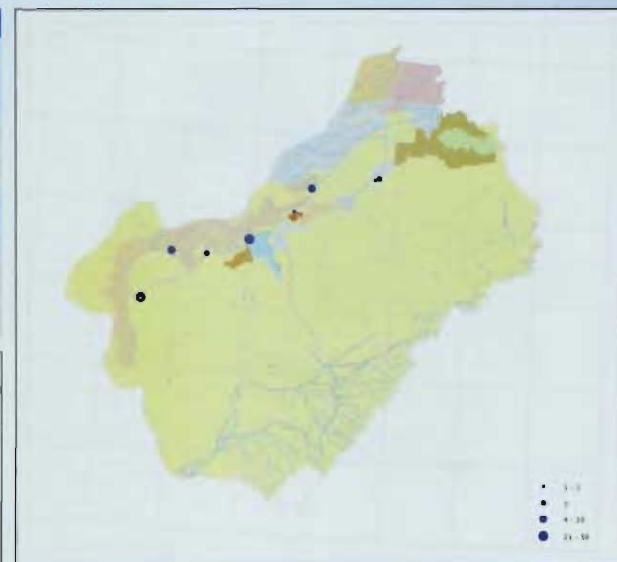
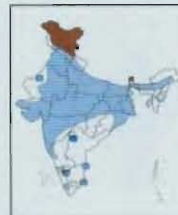
WL(P)A
IV

Residential

WM

Abundance

LCom

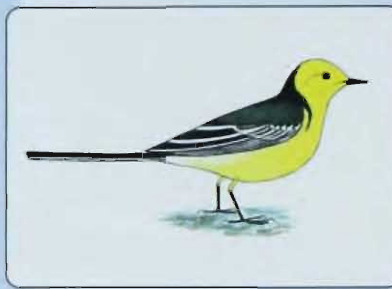


• 1-3
• 4-10
• 11-20
• 21-50



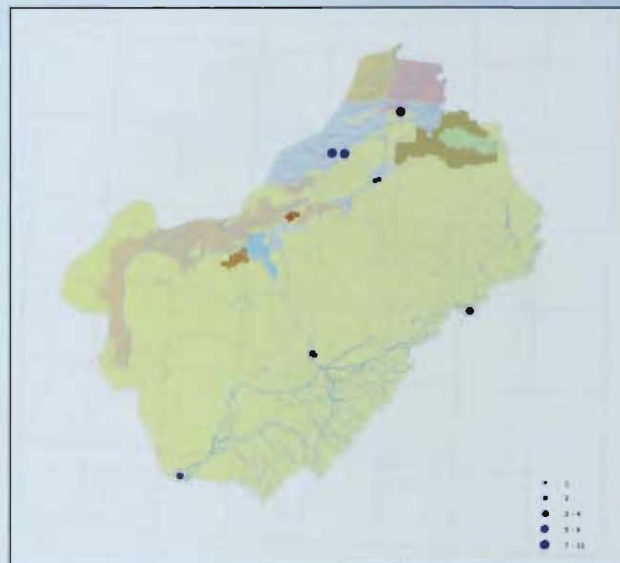
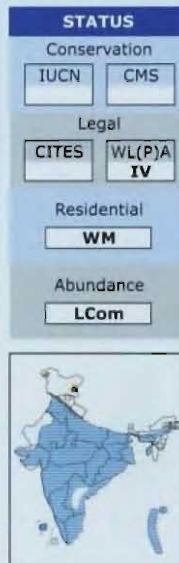
Photo: Gill Cardy

Diagnostics: Sparrow with a long tail; c. 17 cm; C; *Male* has yellow head and underparts, black mantle. *Female* has broad yellow supercilium, which joins the yellow of throat; crown grey; underparts mainly yellow. *Juvenile:* with brownish crown, ear-coverts and mantle, buffish supercilium and buffish-white underparts. **Voice:** Harsh brzzreep, chiz-zit. **Habitat:** Summers on marshy patches below glaciers and melting snow, winters around lakes, jheels and tanks. **Habits:** Highly gregarious during winter, generally occurs at wetlands, sometimes forage on floating vegetation on lakes. **Status and Distribution:** Resident and locally common in Himalayas from J & K to Himachal Pradesh (3000-5000m), winter migrant to plains in India; Pakistan; Nepal; Bhutan; Bangladesh; Sri Lanka.



141. *Motacilla flava* Linnaeus, 1758

Yellow Wagtail

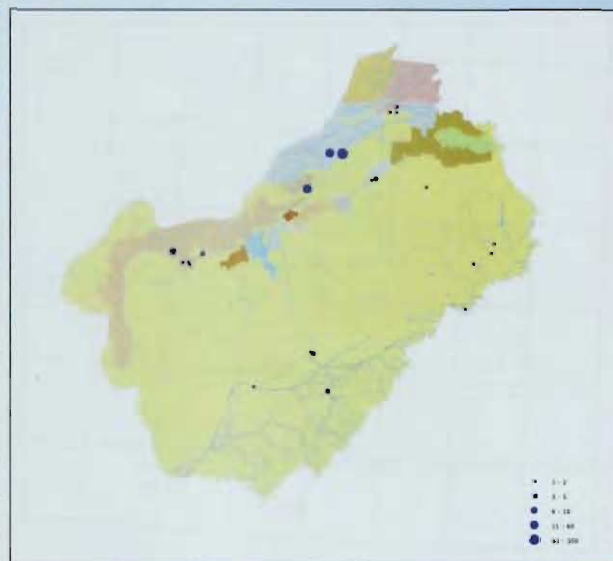


Diagnostics: Sparrow \pm ; 17 cm; **Male (Breeding):** Olive-green upperparts and yellow underparts, with considerable variation in coloration of head depending on race differentiate it from all other Wagtails. **Female:** Often with some features of breeding male, otherwise extremely variable. **Juvenile:** with dark malar stripe and band across breast. **Voice:** A loud disyllabic *tswee-ip*. **Habitat:** Damp pastures, marshy areas with short vegetation, margins of rivers, lakes and jheels. **Habits:** Keeps in small loose flocks, characteristically associates with grazing domestic livestock while foraging and capture insects disturbed by the animal's hooves. **Food:** Insects; flies (muscid), pentatomid bugs, beetles and weevils. **Status and Distribution:** Resident, breeds in NW Himalayas 3600-4500m, locally common and widespread winter migrant in plains and lower hills, also common passage migrant in W & C Himalayas, India; Pakistan; Nepal; Bhutan; Bangladesh; Sri Lanka; Maldives.

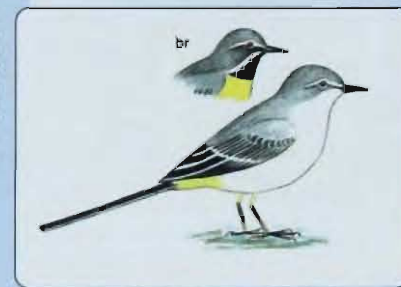


142. *Motacilla cinerea* Tunstall, 1771

Grey Wagtail



Diagnostics: Sparrow, with a long tail; c. 17 cm; C; *Male*: head and back grey, supercilium white, wings dark brown with whitish margins. In breeding throat is black and underparts yellow. *Female*: Throat buff, underparts pale. *Juvenile*: with brownish cast to upper parts, buffish supercilium, and dark mottling on breast. **Voice:** A sharp *stt* or *zee-fit*. **Habitat:** Undisturbed rocky mountain streams with rocky banks during summers, seeps in plains and foothills during winter. **Habits:** Solitary runs around small streams and seeps in forests. **Food:** Mainly insects, occasionally butterflies; tiny molluscs. **Status and Distribution:** Resident in Himalayas summers between 1800-3900 m; winter migrant to plains and foothills in India; Pakistan; Nepal; Bhutan; Bangladesh; Sri Lanka and Maldives.

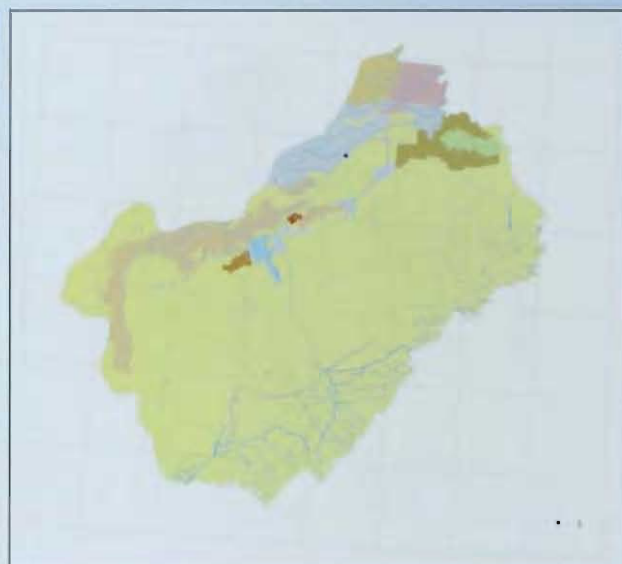


143. *Anthus spinoletta* (Linnaeus, 1758)

Water Pipit



STATUS	
Conservation	
IUCN	CMS
Legal	
CITES	WL(P/A IV
Residential	
WM	
Abundance	
LCom	



Diagnostics: Sparrow #; 15cm; Greyish-brown upper parts; whitish underparts; fairly conspicuous wing-bars; generally dark legs. **Voice:** *tsiip* similar to Rosy Pipit. **Habitat:** Marshes, irrigated cultivation, damp grassy edges of jheels, canals and ditches. **Habits:** Keeps in small-scattered flocks. Flight is undulating and buoyant. **Food:** Insects. **Status and Distribution:** Winter migrant locally common, in N plains and foothills, India; Pakistan and Nepal.



144. *Chaimarrornis leucocephalus* (Vigors, 1831)

White-capped Redstart



STATUS

Conservation

IUCN

CMS

Legal

CITES

WL(P)A
IV

Residential

WM

Abundance

Com

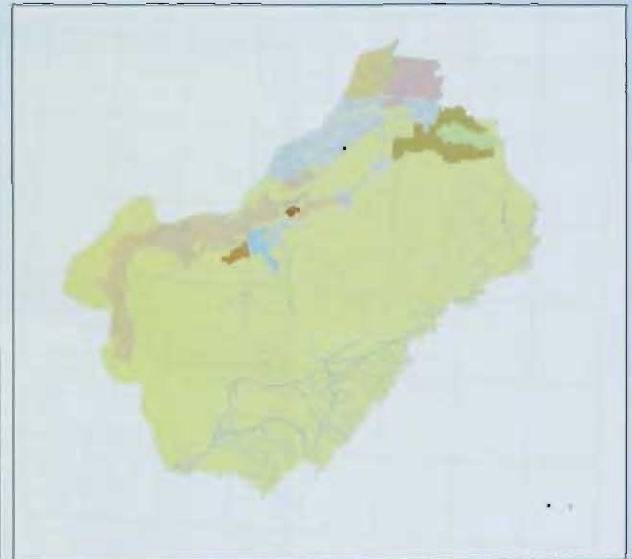


Photo: Vijay Cavale

Diagnostics: Bulbul; c. 19 cm; C/H; Sexes alike. **Adult:** Has white cap contrasting with blue-black head, mantle and breast; rufous belly and rump; tail with broad black terminal band. **Juvenile:** Rump and tail as adult but black fringes to white crown, brownish-black upperparts and blackish underparts. **Voice:** tseee; sit sit; low whistle. **Habitat:** Mountain streams and rivers, along canals at low altitude during winter; in summer, also in alpine meadows and rocky areas far from water. **Habits:** Occurs singly or in pairs, perches on stones in torrents or rocky banks, has distinctive habit of pumping and fanning its tail. **Food:** Mainly insects; also berries. **Status and Distribution:** Resident, undertake altitudinal movements; winter migrant as well; breeds in Himalayas, summers between 1830-4860 m, restricts up to 1500 m during winter, from Pakistan east to Arunachal Pradesh, NE Indian hills; Pakistan; Nepal; Bhutan; Bangladesh.



Siberian Crane, *Grus leucogeranus*



A critically threatened species which was recorded till year 2002 from the adjoining Keoladeo National Park in Rajasthan

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Annexure 1. Codes for observation sites

Site code	District	Locality	Date(M_D_Y)	Habitat	Reference	Remarks
1	Jodhpur	Guda Forest Enclosure	1/15/2002	Freshwater annual pond	DoE Project	
2	Jodhpur	Khejari Pond	1/15/2002	Freshwater annual pond	DoE Project	
3	Pali	Sardarsamand	1/15/2002	Reservoir	DoE Project	
4	Jodhpur	Kumhara Tank, Bhopalgarh	1/16/2002	Freshwater annual pond	DoE Project	
5	Jodhpur	Akheraj Talab near Kailana	1/18/2002	Freshwater annual pond	DoE Project	
6	Jodhpur	Kailana Lake	1/18/2002	Reservoir	DoE Project	
7	Jaisalmer	Chandhan	1/28/2002	Sandy plains with Agriculture	DoE Project	
8	Jaisalmer	Sam Area & Dunes	1/29/2002	Sand dunes	DoE Project	
9	Jaisalmer	Digha Lake	1/30/2002	Escape reservoir	DoE Project	
10	Jaisalmer	Ø RD Mohangarh	1/30/2002	Canal	DoE Project	
11	Jaisalmer	1356 RD Escape Reservoir	1/30/2002	Escape reservoir	DoE Project	
12	Hanumangarh	Agri. Res. Station, Hanumangarh	2/11/2002	Managed agriculture farm	DoE Project	
13	Bikaner	Agri. Uni. Bikaner	2/13/2002	Managed agriculture farm	DoE Project	
14	Ganganagar	Mech. Agr. Farm, Rojari	2/15/2002	Managed agriculture farm	DoE Project	
15	Bikaner	507 RD Lake, Ghonghra	2/16/2002	Escape reservoir	DoE Project	
16	Jodhpur	Jaziwal Pond	2/22/2002	Freshwater perennial pond	DoE Project	
17	Jodhpur	near Guda Pond	2/22/2002	Freshwater annual pond	DoE Project	
18	Jodhpur	Asapura-Oran Pond	2/22/2002	Sacred Grove with pond	DoE Project	
19	Jodhpur	Jaziwal Pond (cf16)	2/22/2002	Freshwater perennial pond	DoE Project	
20	Jodhpur	Guda Bada Talab (cf 1)	2/22/2002	Freshwater perennial pond	DoE Project	
21	Pali	Hemawas Dam (cf 60)	2/28/2002	Reservoir	DoE Project	
22	Pali	Kharda Dam (cf 62)	2/28/2002	Reservoir	DoE Project	
23	Pali	Lordia	2/28/2002	Freshwater annual pond	DoE Project	
24	Pali	Lakhotia	2/28/2002	Freshwater annual pond	DoE Project	
25	Nagaur	Panchla Sidha (Madhania ki Dhani)	3/14/2002	Sandy plains	DoE Project	
26	Churu	Tal Chhaper	3/15/2002	Protected area	DoE Project	
27	Nagaur	Tilanash (pond)	6/27/2002	Freshwater annual pond	DoE Project	
28	Ganganagar	Suratgarh (transect)	3/29/2001	Canal side plantation	DoE Project	
29	Bikaner	Gajner Palace Lake	3/18/2002	Freshwater perennial pond	DoE Project	

Geo-spatial Atlas for the Wetland Birds of Thar Desert, Rajasthan

Site code	District	Locality	Date(M_D_Y)	Habitat	Reference	Remarks
30	Bikaner	Khara Agr. Farm (RAU)	3/19/2002	Managed agriculture farm	DoE Project	
31	Bikaner	Khara Farm Lake	3/19/2002	Freshwater annual pond	DoE Project	
32	Bikaner	750 RD Lake	3/20/2002	Escape reservoir	DoE Project	
33	Bikaner	Mukam (Nokha)	6/3/2002	Groves Bishnoi's	DoE Project	
34	Jodhpur	Mehraj ji ka Oran	6/4/2002	Groves	DoE Project	
35	Jodhpur	Mandore	6/11/2002	Garden (public)	DoE Project	
36	Pali	Sandra Forest Range	6/13/2002	Garden (private)	DoE Project	
37	Pali	Chang Forest	2/14/2002	Stony and gravelly	DoE Project	
38	Jodhpur	Dhanari Kalan	6/17/2002	Farming commercial	DoE Project	
39	Pali	Jawal Bandh	6/20/2002	Reservoir	DoE Project	
40	Bikaner	RAU Field Station , Jawal Ban	6/21/2002	Managed agriculture farm	DoE Project	
41	Jalore	Ahore	7/17/2002	Stony and gravelly	DoE Project	
42	Jaisalmer	Bhadriya	7/11/2002	Oran	DoE Project	
43	Nagaur	Chosili	6/27/2002	Stony and gravelly	DoE Project	
44	Nagaur	Merta City	6/28/2002	Stony and gravelly	DoE Project	
45	Jaisalmer	1250 RD-1205 RD (transect)	7/10/2002	Canal side plantation	DoE Project	
46	Barmer	Samdari (6km towards Siwana)	7/18/2002	Saline beds	DoE Project	
47	Barmer	Mewari	7/19/2002	Stony and gravelly	DoE Project	
48	Churu	Tal Chhaper	4/8/2001	Protected area	DoE Project	
49	Jaisalmer	1140 RD	2/00/2001	Escape reservoir	DoE Project	
50	Jaisalmer	1356 RD Lake	2/00/2001	Escape reservoir	DoE Project	
51	Bikaner	750 RD Lake, Depression No. 14	12/00/2000	Escape reservoir	DoE Project	
52	Jaisalmer	Amar Sagar	00000000	Freshwater pond	DoE Project	
53	Jaisalmer	Bada Bag	00000000	Freshwater pond	DoE Project	
54	Hanumangarh	Badopal	12/00/2000	Saline perennial lake	DoE Project	
55	Bikaner	Chattargarh	12/00/2000	Canal side plantation	DoE Project	
56	Jaisalmer	Gadisar Lake	02/00/2001	Lake	DoE Project	
57	Bikaner	Gajner Lake	3/18/2002	Freshwater annual pond	DoE Project	
58	Siker	Harsh Parbat	4/12/2001	Rocky hills	DoE Project	
59	Siker	Harsh Parbat	11/00/2000	Deciduous forest	DoE Project	

Site code	District	Locality	Date(M_D_Y)	Habitat	Reference	Remarks
60	Pali	Hemawas Dam	5/30/2000	Reservoir	DoE Project	
61	Pali	Jawai Bandh	02/00/2001	Reservoir	DoE Project	
62	Pali	Kharda Dam	02/00/2001	Reservoir	DoE Project	
63	Jaisalmer	Kishangarh BSF Camp	02/00/2001	Abandoned Fort	DoE Project	
64	Hanumangarh	Kola Forest Farm	9/9/2002	Protected area	DoE Project	
65	Jhunjhunun	Kot Bandh	11/00/2000	Reservoir	DoE Project	
66	Sikar	Shakambri valley	4/11/2001	Sacred Grove	DoE Project	
67	Jodhpur	Osian	9/26/2000	Scrub	DoE Project	
68	Pali	Phulad	02/00/2001	Reservoir	DoE Project	
69	Jaisalmer	Sam	02/00/2001	Sand dunes	DoE Project	
70	Pali	Sardarsamand	2/13/2001	Reservoir	DoE Project	
71	Jaisalmer	Sudasari DNP	03/00/2001	Grassland	DoE Project	
72	Churu	Tal Chhaper	9/11/2002	Protected area	DoE Project	
73	Jaisalmer	Tanot	02/00/2001	Grassland	DoE Project	
74	Ganganagar	Jamsar Canal	3/30/2001	Canal	DoE Project	
75	Ganganagar	Rang Mahal	3/31/2001	Wetland	DoE Project	
76	Bikaner	Lunkaransar	3/4/2001	Seepage water body	DoE Project	
77	Jaisalmer	1356 Head	02/00/2001	Canal	DoE Project	
78	Jaisalmer	Sultana Lake	01/00/2001	Escape reservoir	DoE Project	
79	Jaisalmer	Surroundings of Mohangarh	01/00/2001	Urban	DoE Project	
80	Bikaner	Bharujee Temple Lake	01/00/2001	Lake	DoE Project	
81	Jhunjhunun	Indrapura	11/00/2000	Agriculture field	DoE Project	
82	Ganganagar	Suratgarh_Anupgarh Rd.(Spot)	4/6/2001	Stony and gravelly	DoE Project	
83	Jhunjhunun	Pilani_Jhunjhunun Rd.(Transect)	4/9/2001		DoE Project	
84		Churu_Sikar (Transect)	4/10/2001		DoE Project	
85	Jaisalmer	IGNP Seepage	02/00/2001	Wetland	DoE Project	
86	Pali	Gundoj Dam	02/00/2001	Reservoir	DoE Project	
87	Hanumangarh	Devasar (Depression Area)	12/00/2000	Ghaggar depression	DoE Project	
88	Bikaner	507 RD Lake	12/4/2000	Escape reservoir	DoE Project	
89	Jaisalmer	Mohangarh Area	02/00/2001	Canal side plantation	DoE Project	

Site code	District	Locality	Date(M_D_Y)	Habitat	Reference	Remarks
90	Ganganagar	Suratgarh	9/6/2002	Grassland	DoE Project	
91	Bikaner	Canal Side Plantation (transect)	3/18/2001	Canal side plantation	DoE Project	
92	Hanumangarh	Badopal Depression No. 6	9/7/2002	Ghaggar depression	DoE Project	
93	Jaisalmer	Digha Lake	01/00/2001	Escape reservoir	DoE Project	
94	Sikar	Harsh Parbat, Harshnath	9/13/2002	Stony and gravelly	DoE Project	
95	Ganganagar	Suratgarh	9/6/2002	Freshwater perennial pond	DoE Project	
96	Pali	Hemawas Dam	7/18/2002	Reservoir	DoE Project	
97	Pali	Hemawas Dam	1/17/2002	Reservoir	DoE Project	
98	Jodhpur	Kailana lake	6/12/2002	Reservoir	DoE Project	
99	Hanumangarh	Kola Forest Farm	4/5/2001	Protected area	DoE Project	
100	Jaisalmer	Sudasari, Outside	20010300	Sandy plains	DoE Project	
101	Pali	Sardarsamand	6/6/2000	Reservoir	DoE Project	
102	Hanumangarh	Badopal	9/6/2002	Saline lake	DoE Project	
103	Bikaner	750 RD, Depression No. 7	12/00/2000	Escape reservoir	DoE Project	
104	Jaisalmer	Digha Lake	02/00/2001	Escape reservoir	DoE Project	
105		Jodhpur-Bikaner (Transect)	3/29/2001		DoE Project	Not plotted
106	Bikaner	Gajner Lake	01/00/2001	Freshwater perennial pond	DoE Project	
107	Pali	Kharda Dam	1/17/2002	Reservoir	DoE Project	
108	Jodhpur	In and around Jodhpur	00000000	Urban	Chhangani, 2002	
109	Jodhpur	Machia Safari Park	00000000	Reservoir	Bohra & Goel, 1992	
110	Jodhpur	Kailana & Bijoli	00000000	Reservoir	Katju & Mohnot, 1995	
111	Bikaner & Jaisalmer	IGNP Stage II	00000000	Canal	Soni, 1994	
112	Jaisalmer	DNP	00000000	Grassland	Rahmani, 1996	
113	Churu	Chapper	00000000	Protected area	Rahmani, 1996	
114	Bikaner	Gajner	00000000	Freshwater perennial pond	Rahmani, 1996	
115	Pali	Sumer	5/23/2003		DoE Project	
116	Pali	Nadol (Desuri)	5/24/2003		DoE Project	
117	Pali	Lampi (Raipur)	5/26/2003	Freshwater pond	DoE Project	
118	Pali	Nanar (Raipur)	3/5/2003	Freshwater pond	DoE Project	
119	Hanumangarh	Tibi	5/9/2003		DoE Project	

Site code	District	Locality	Date(M_D_Y)	Habitat	Reference	Remarks
120	Ganganagar	Talwara Jhil	5/8/2003	Reservoir	DoE Project	Not plotted
121	Ganganagar	Karanpur	5/10/2003		DoE Project	
122	Ganganagar	Forest Nursery	5/11/2003	Oasis	DoE Project	
123	Ganganagar	Suratgarh	5/13/2003		DoE Project	
124	Jaisalmer	Mohangarh (IGNP Canal)	5/16/2003	Canal	DoE Project	
125	Jaisalmer	Mohangarh (IGNP Canal)	5/16/2003	Canal	DoE Project	
126	Jaisalmer	Sam (DNP) Area	5/17/2003	Scrub	DoE Project	
127	Barmer	Shiv	5/18/2003		DoE Project	
128	Barmer	Gadra Road	5/19/2003	Urban	DoE Project	
129	Nagaur	Merta Road	3/4/2003	Urban	DoE Project	
130	Nagaur	Sambar	3/5/2003	Saline lake	DoE Project	
131	Nagaur	Didwana	3/6/2003	Saline lake	DoE Project	
132	Jhunjhunun	Chirawa	3/17/2003		DoE Project	
133	Jhunjhunun	Mandawa	3/8/2003		DoE Project	
134	Jhunjhunun	Nawalgarh	3/8/2003		DoE Project	
135	Jhunjhunun	Udaipurwati	3/8/2003		DoE Project	
136	Churu	Nawan	3/9/2003		DoE Project	
137	Churu	Suratpura	3/9/2003		DoE Project	
138	Churu	Kohina	3/10/2003		DoE Project	
139	Churu	Sardar Shahar	3/10/2003		DoE Project	
140	Churu	Ratangarh	3/11/2003		DoE Project	
141	Churu	Talchaper Sanctuary	3/27/2003	Protected area	DoE Project	
142	Jalore	Sikwara	2/7/2003		DoE Project	
143	Jalore	Sundaji Parwat	2/8/2003	Forest	DoE Project	
144	Jalore	Jaswantpura Forest	2/10/2003	Forest	DoE Project	
145	Sirohi	Mungthala	2/12/2003		DoE Project	
146	Jodhpur	Kailana area	1/17/2003	Reservoir	DoE Project	
147	Jodhpur	Umaid Bhawan Tank	1/17/2003	Annual pond	DoE Project	
148	Pali	Chotila Village	1/9/2003		DoE Project	
149	Jodhpur	Barli Dumping Site	1/8/2003	Scrub	DoE Project	
150	Jodhpur	Phool bagh	7/4/2002	Pond	Kumar, <i>et. al.</i> , 2002	
151	Barmer	Chohtan	10/24/2002		DoE Project	

Site code	District	Locality	Date(M_D_Y)	Habitat	Reference	Remarks
152	Barmer	Laharawa	10/25/2002		DoE Project	
153	Jalore	Bhawatra (Luni River)	10/26/2002		DoE Project	
154	Jalore	Kukkadra (Rann)	10/27/2002	Rann	DoE Project	
155	Barmer	Balotra (Luni River)	10/29/2002	River bed	DoE Project	
156	Barmer	Pachpadra	10/30/2002	Saline lake	DoE Project	
157	Jaisalmer	Barna	10/1/2002		DoE Project	
158	Barmer	Bandera	10/3/2002		DoE Project	
159	Jaisalmer	Myazlar	10/5/2002		DoE Project	
160	Jaisalmer	Sam	10/6/2002	Scrub	DoE Project	
161		West Rajasthan	00000000		Mukherjee, 1995	Unspecified locality
162		South Rajasthan	00000000		Mukherjee, 1995	Unspecified locality
163		Thar	00000000		Sangha, 2002	Unspecified locality
164	Nagaur	Sambhar	00/00/1994	Saline lake	Gopal & Sharma, 1994	
165		Thar	00/1993-94		Rahmani, 1997	Unspecified locality
166	Bikaner	Diyatra	00/1993-94		Rahmani, 1997	
167	Jodhpur	Bap	00/1993-94		Rahmani, 1997	
168	Jodhpur	Keechan	00/1993-94		Rahmani, 1997	
169	Jaisalmer	Khinya	00/1993-94		Rahmani, 1997	
170	Bikaner	Lunkaransar	00/1993-94		Rahmani, 1997	
171	Bikaner	954 RD (near Bajju)	00/1993-94		Rahmani, 1997	
172	Bikaner	860 RD	00/1993-94		Rahmani, 1997	
173	Bikaner	Gajner	00/1993-94		Rahmani, 1997	
174	Bikaner	Bangasar Lift Canal	00/1993-94		Rahmani, 1997	
175	Jodhpur	Guda Vishnoian	00/1993-94		Rahmani, 1997	
176	Jaisalmer	Nachna	00/1993-94		Rahmani, 1997	
177		Noda Minor	00/1993-94		Rahmani, 1997	Not plotted
178	Ganganagar	Suratgarh	01/00/1994		Rahmani, 1997	
179	Hanumangarh	Badopal	00/1993-94		Rahmani, 1997	
180	Bikaner	507 RD	00/1993-94		Rahmani, 1997	
181	Jaisalmer	Mohangarh	00/1993-94		Rahmani, 1997	
182	Bikaner	Kolayat	00/1993-94		Rahmani, 1997	
183	Bikaner	Nokh	00/1993-94		Rahmani, 1997	

Site code	District	Locality	Date(M_D_Y)	Habitat	Reference	Remarks
184	Jaisalmer	Sudasari	05/00/1994		Rahmani, 1997	
185	Bikaner	Somra village near Nokh	00/1993-94		Rahmani, 1997	
186	Nagaur	Didwana	00/1993-94		Rahmani, 1997	
187		Koliya village	00/1993-94		Rahmani, 1997	Not plotted
188	Nagaur	Sambhar	00/1993-94		Rahmani, 1997	
189	Churu	Talchapar	11/00/2005		Sangha, pers. comm.	
190	Barmer	Shiv	00/1993-94		Rahmani, 1997	
192	Bikaner	Bajju	00/1993-94		Rahmani, 1997	
193	Bikaner	910 RD	00/1993-94		Rahmani, 1997	
194	Bikaner	930 RD	00/1993-94		Rahmani, 1997	
195	Bikaner	Bhikampur	00/1993-94		Rahmani, 1997	
196	Jodhpur	Pichlak Lake	00/1993-94		Rahmani, 1997	
197	Jaisalmer	Kanoi	00/1993-94		Rahmani, 1997	
198	Jodhpur	Kanasar	00/1993-94		Rahmani, 1997	
199	Barmer	Barmer	00/1993-94		Rahmani, 1997	
200	Churu	Talchapar	00/1993-94		Rahmani, 1997	
201		Kowadisar tank	00/1993-94		Rahmani, 1997	Not plotted
202	Jaisalmer	1333 RD	2/14/1994		Sangha, 1994	
203	Jaisalmer	1440 RD (near Mohangarh)	2/15/1994		Sangha, 1994	
204	Pali	Khada	00000000		Sangha, 2002	
205	Pali	Sardarsamand	1/5/1989		Sangha, 2002	
206	Barmer	Kagoda	2/19/1994		Sangha, 2002	Not plotted
207	Nagaur	Sambhar Lake	00/11/2005		Sangha, pers. comm.	
208	Nagaur	Sambhar	09/00/1998		Sangha, 2002	
209	Hanumangarh	Badopal	00/00/1989		Sangha, 2002	
210	Bikaner	Chatargarh	00/00/1989		Sangha, 2002	
211	Jodhpur	Balsamand	1/15/1989		Sangha, 2002	
212	Pali	Nimaj	12/00/1998		Sangha, 2002	
213	Barmer	Navoda (near Pachpadra)	12/00/1998		Sangha, 2002	
214	Bikaner	507 RD	10/2/1998		Sangha, 2002	
215	Sikar	Revasa	9/12/1998		Sangha, 2002	

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Site code	District	Locality	Date(M_D_Y)	Habitat	Reference	Remarks
216	Nagaur	Kuchaman	10/25/1991		Sangha, 2002	
217	Jodhpur	Jodhpur	00000000		Sangha, 2002	
218	Churu	Talchapar	1/28/1996		Sangha, 2002	
219	Jaisalmer	Jaisalmer	00000000		Sangha, 2002	
220	Bikaner	Gajner	12/00/1990		Sangha, 2002	
221	Bikaner	Jodh beed	3/28/1993		Sangha, 2002	
222	Pali	Pali	02/00/1991		Sangha, 2002	
223	Jaisalmer	Sam	00000000		Sangha, 2002	
224	Nagaur	Deedwana	2/1/1998		Sangha, 2002	
225	Jaisalmer	Gadisar	8/16/1989		Sangha, 2002	
226	Hanumangarh	Suratgarh	3/28/1999		Sangha, 2002	
227	Jodhpur	Danglawas	8/10/1966		Sangha, 2002	
228	Bikaner	540 RD	00/1993-94		Rahmani, 1997	
233	Sikar	Revasa	01/00/1998		Sangha, 2005	
230	Jodhpur	Osian	05/00/1994		Rahmani, 1997	
231	Jodhpur	Phalodi	05/00/1994		Rahmani, 1997	
191	Bikaner	710 RD (ETF)	00000000		Rahmani, 1997	
232	Churu	Talchapar	10/14/1995		Sangha, 2005	
229	Churu	Talchapar	1/28/1998		Sangha, 2005	
234	Churu	Talchapar	2/1/1998		Sangha, 2005	
235	Jaisalmer	Jaisalmer	1/18/1999		Sangha, 2005	
236	Jaisalmer	Baramsar depression	10/18/2003		Sangha, 2005	
237	Hanumangarh	Badopal	12/00/2000		Sangha, 2005	
238	Jaisalmer	Ganga village, onway Sudasari	12/26/1998		Sangha, 2005	Not plotted
239	Bikaner	Jor-Bir Depression	10/22/1991		Sangha, 2005	
240	Nagaur	Sambhar	00000000		BirdLife Int., 2001,	
241	Jodhpur	Guda Vishnoian	00000000		BirdLife Int., 2001	
242	Hanumangarh	Talwara Jheel (near Bikaner)	12/00/1993		BirdLife Int., 2001	Not plotted
243	Jaisalmer	1333 RD	00000000		BirdLife Int., 2001	Repeat locality
244	Jaisalmer	1440 RD (near Mohangarh)	02/00/1994		BirdLife Int., 2001	Repeat locality

Site code	District	Locality	Date(M_D_Y)	Habitat	Reference	Remarks
245	Pali	Lakhotia wetland	02/00/1991		BirdLife Int.,2001	
246	Nagaur	Sambhar Lake	00/00/1870		BirdLife Int.,2001	
247	Jodhpur	Pichlak Lake	00000000		BirdLife Int.,2001	
248	Jodhpur	Guda Vishnonian	00000000		BirdLife Int.,2001	
249	Nagaur	Sambhar Lake	00000000		BirdLife Int.,2001	
250	Bikaner	Jod-Beed	00000000		BirdLife Int.,2001	
251	Jodhpur	Jodhpur	00/00/1800		BirdLife Int.,2001	
252	Pali	2km before Pali on Jalore Rd.	10/29/2005		Kankane, (Unpublished)	
253	Nagaur	Sambhar Lake	9/5/1999		Sangha, 2002	
254	Nagaur	Deedwana	1/29/1996	Saline lake	Sangha, 2002	
255	Sikar	Revasa	5/23/1999		Sangha, 2002	
256	Nagaur	Kochia ki Dhani (near Sambhar)	9/9/1998	Freshwater lake	Sangha, 2002a	Not plotted
257	Sikar	Revasa	3/15/1998		Sangha, 2002	
258	Pali	Sardarsamand	3/28/1993		Sangha, 2002	
259	Nagaur	Sambhar	8/13/1994		Sangha, 2002	
260	Nagaur	Kuchaman	2/1/1998		Sangha, 2002	
261	Nagaur	Sambhar	9/23/1996		Sangha, 2002	
262	Jaisalmer	Samra village(near Nokh)	00000000			Deleted
263	Barmer	Shiv-Bisu Road	3/5/1993	Fallow land	Rahmani, 1997	
264	Bikaner	Between RD 505-710	01/00/1994		Rahmani, 1997	
265	Bikaner	Between RD 930-Bhikampur	01/00/1994		Rahmani, 1997	
266	Bikaner	Between Bhikampur-Nachna	01/00/1994		Rahmani, 1997	
267	Bikaner	Mankasar	1/24/1994		Rahmani, 1997	
268	Bikaner	Gajner	1/3/1990		Sangha, 2002	
269	Bikaner	Between RD 930-961	00/1993-94		Rahmani, 1997	
270	Sikar	Revasa	6/2/1998		Sangha, 2002	
271	Nagaur	Kuchaman	6/9/1993		Sangha, 2002	
272	Bikaner	Bikaner	01/00/1912		BirdLife Int.,2001	
273	Nagaur	Sambar	00/00/1873		Sangha, 2005	
274	Nagaur	Sambar	8/7/1998		Sangha, 2002	
275	Nagaur	Sambar	5/3/1998		Sangha, 2002	

00000000 No specified date

Annexure 2. Data source**A. Topo sheets (Scale 1:1,000,000) Survey of India**

S.N.	Reference	Title Name	Year of Publication
i)	NG 43	Rajasthan	1986
ii)	NG 43	Delhi	1965/1978
iv)	NG 42	Sindh	1976

B. Resource Atlas of Rajasthan, Department of Science and Technology, Govt. of Rajasthan (Anonymous, 1994)

S.N.	Title	Base map/s	Attributes
1.	State	SOI topo sheets (ref. A above)	Boundary, drainage
2.	Districts	SOI topo sheets (ref. A above)	Boundary
3.	Development Blocks	Resource atlas of Rajasthan	Boundary
4.	Human settlements	SOI topo sheets (ref. A above)	Point
5.	Rainfall	Resource atlas of Rajasthan	< 10 cm, 10-20 cm, 20-30 cm, 30-40 cm, 40-50 cm, 50-60 cm, 60-70 cm, 70-80 cm
6.	Temperature regime (June)	Resource atlas of Rajasthan	< 32°C, 32-36°C, 36-38°C, 38-40°C, 40-42°C, >42°C
7.	Temperature regime (January)	Resource atlas of Rajasthan	<6°C, 6-8°C, 8-10°C, >10°C
8.	Mean Annual Potential Evapotranspiration	Resource atlas of Rajasthan	C>200 cm, 190-200 cm, 180-190 cm, 170-180 cm, 160-170 cm, 150-160 cm, 140-150 cm
9.	Indira GandhiNahar project (IGNP) Command area	Resource atlas of Rajasthan	Stage I, Stage II, Bangarsar liftscheme, Bhakra Canal area, Gang canal area, Phalodi lift scheme, Pokharan lift scheme, Sahawa lift scheme, under Sidhmukh area

C. Remote Sensing Data IRS-1D LISS-III

Period	Path	Row
October, November, December 2002	89	52,53
	90	52,53,54
	91	51,52,53,54,55
	92	50,51,52,53,54
	93	50,51,52,53
	94	50,51,52,53

Annexure 3. Globally Threatened species vs. species under WL(P) Act, 1972

S.No.	Species	GT	WL(P) Act, 1972
1	Spot-billed Pelican	VU	IV
2	Dalmatian Pelican	VU	IV
3	Marbled Teal	VU	IV
4	Sarus Crane	VU	IV
5	Sociable Lapwing	CR	IV
6	Indian Skimmer	VU	0
7	Pallas's Fish-Eagle	VU	I
8	Greater Spotted Eagle	VU	I
9	Eastern Imperial Eagle	VU	I

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<i>Alcedo atthis</i>	18, 169	<i>Charadrius dubius</i>	16, 114	<i>Ixobrychus sinensis</i>	14, 64	<i>Plegadis falcinellus</i>	15, 73
<i>Amaurornis phoenicurus</i>	16, 104	<i>Charadrius leschenaultii</i>	16, 117	<i>Larus brunnicephalus</i>	17, 153	<i>Pluvialis fulva</i>	16, 112
<i>Anas acuta</i>	15, 91	<i>Charadrius mongolus</i>	16, 116	<i>Larus cachinnans</i>	17, 151	<i>Pluvialis squatarola</i>	16, 113
<i>Anas clypeata</i>	15, 90	<i>Chlidonias hybrida</i>	18, 159	<i>Larus ichthyaetus</i>	17, 152	<i>Podiceps cristatus</i>	14, 45
<i>Anas crecca</i>	15, 93	<i>Ciconia episcopus</i>	15, 71	<i>Larus ridibundus</i>	17, 154	<i>Podiceps nigricollis</i>	14, 46
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Notes

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are approximately 20 lines visible. The paper appears to be a standard notebook page.



Flock of Garganey and Wigeon. (Gaston de Silva Wijeyeratne)



Cover Page Photo Credits



Sarus Crane. K.S. Gopi Sundar



Greater Flamingo. Gehan de Silva Wijeyeratne



Demoselle Crane. International Crane Foundation



Bar-Headed Geese. Vijay Cavale



Sociable Lapwing. Marten van Dijk



Great White Pelican. Bhumes Bharti



PRICE

Indian: Rs. 2,000.00

Foreign: \$ 80; £ 60

